THE IRON TRADE REVIEW

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Trend in the Right Direction

With Very Encouraging Increase in Sales of Pig Iron—Moderate Buying of Ore—Finished Lines Fairly Active

Favorable developments continue to dominate the iron trade, although there are some weak spots. There is a growing conviction that much greater activity will soon prevail, but both buyers and sellers are cautious about making contracts involving deliveries at distant dates. It is probable that the next report of unfilled tonnage by the Steel Corporation will show little change, as its shipments and bookings have been about equal at from 30,000 to 35,000 tons daily.

Iron Ore

Buying of Lake Superior iron ores during the past week has been confined, to a large extent, to companies affiliated with the leading ore producers. Blast furnace operators not so connected are showing a disposition to proceed slowly. This attitude was expected by the sellers. The action of the interstate commerce commission in reducing the carrying rates from Mesabi mines to upper lake docks 5 cents per ton, making the rate 55 cents, is regarded as indicating a conservative policy. A considerably heavier cut would not have caused surprise. Leading ore companies will resist any effort to reduce prices of Mesabi ores on account of the reduction in the rail rate.

Pig Iron

Pig iron buying shows very gratifying increase in volume. Orders aggregating about 100,000 tons have been placed very quietly in New York. Buying of basic includes 50,000 tons by the Youngstown Sheet & Tube Co., 10,000 tons by the American Steel Foundries and round tonnages by the United Steel Co., American Rolling Mill Co. and other consumers in the central west. The purchase by an eastern steel company of 13,000 tons of low phosphorus iron for delivery to begin at once was based on the belief that steel companies will have all the domestic business they can take care of in 60 to 90 days and that now is the time for buying pig iron. In the Chicago district, sales of the past week are estimated at from 50,000 to 80,000 tons of various grades.

Sales of southern iron have shown decided improvement and some large sellers are now asking from $9.75 to $10 for the last quarter.

Plates

Weakness in plates prevails at Chicago and Pittsburgh, but in eastern territory and at Cleveland, mills are busy and prices are being well maintained. Three eastern Pennsylvania platemakers will furnish from 5,000 to 6,000 tons for the 144 locomotives to be built by the Pennsylvania railroad at Altoona. The steel required for the 2,100 cars to be built by the Pennsylvania in its shops is still pending.

Sheets

In spite of the very high price of spelter, reports continue to be heard of shading on prices of galvanized sheets. This is generally attributed to companies which expect to cease manufacturing these sheets as soon as their present supply of spelter is exhausted. A Cleveland company has contracted for from 8,000 to 10,000 tons of light plates and sheets for its requirements for the last half of the year.

Ferro Manganese

Shipments of ferro-manganese aggregating more than 1,000 tons have been received from England and the outlook for a continued supply is favorable. Some users are still protesting against the pledges demanded by the shippers.

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Relative Prices of Iron Ore and Pig Iron

IRON ore prices are always affected by the conditions prevailing immediately before or at the time of the fixing of the schedule. Naturally, in a time of great prosperity, iron ore producers believe that they are entitled to higher prices and the schedule is determined accordingly, while in years of depression the opening of the buying movement is postponed and concessions are made to the buyers. In the boom year 1899, Mesabi non-bessemer sold at $2 at the time of the first buying movement in February, but after the great prosperity of that year, there was a second buying movement in December, when Mesabi non-bessemer sold at $4. The prices of pig iron and finished materials slumped badly in 1900 and ore prices for 1901 were not named until April 15 of that year, when $2.75 was the price for Mesabi non-bessemer. In the nine announcements of prices preceding that of April 19, 1915, there were advances in four, reductions in four and in one year the price of the preceding year was re-affirmed. Following the custom of earlier years, we herewith publish a table showing prices of Mesabi non-bessemer ore and the average price of basic pig iron in each period preceding the naming of the price of the ore, Mesabi non-bessemer being taken because it involves the largest tonnage of the four groups and because it is the principal ore used in making basic pig iron. The preceding period covers the time from one announcement of ore prices to the next announcement.

MESABI NON-BESSEMER ORE AND AVERAGE BASIC PIG IRON.

Date of Ore Announcement.	Ore price.	Pig iron in period preceding.
Dec. 5, 1905	$3.50	$15.03
Nov. 5, 1906	4.00	18.34
June 15, 1908	3.50	19.79
May 10, 1909	3.50	14.64
Dec. 24, 1909	4.00	15.85
Apr. 21, 1911	3.50	14.47
Mar. 20, 1912	2.85	12.70
Nov. 19, 1912	3.40	14.25
May 1, 1914	2.85	14.38
Apr. 15, 1915	2.85	12.73

An examination of this table shows that advances in ore prices were followed by advances in pig iron prices in three years, an advance in ore was followed by a decline in pig iron one year, reductions in ore prices were followed by declines in pig iron values in three years, reduction in the price of ore was followed by an advance in one year, and in the case in which the price was re-affirmed, the price of pig iron advanced in the next period $1.21. These facts are shown in the following table:

ADVANCES AND DECLINES IN BASIC PIG IRON IN PERIODS FOLLOWING ANNOUNCEMENT OF ORE PRICES.

Date of ore announcement	Advance or decline in ore.		Advance or decline in pig iron prices in period following.	
Dec. 5, 1905	advance	$0.50	advance	$3.31
Nov. 5, 1905	advance	.50	advance	1.45
June 15, 1908	decline	.50	decline	5.15
May 10, 1909	same price		advance	1.21
Dec. 24, 1909	advance	.50	decline	1.40
Apr. 21, 1911	decline	.50	decline	1.77
Mar. 20, 1912	decline	.65	advance	1.55
Nov. 19, 1912	advance	.55	advance	.13
May 1, 1914	decline	.55	decline	1.65
Apr. 19, 1915	same price			

This table shows that the rule is that advances in ore are usually followed by advances in pig iron and reductions in ore by declines in pig iron, although in one year out of four the reverse has been true. If we may judge from the experience of the one preceding case, in which the ore price was re-affirmed, an advance may be expected this year in the price of pig iron. Last year, when iron ore prices were fixed, pig iron was down to cost at most blast furnace plants, and the price of pig iron has since declined. It seems highly improbable that there will be any further decline and, if general conditions continue to improve, a fair advance may be expected.

The meeting of foundrymen of Ohio to be held at the Hotel Gibson, Cincinnati, Friday of this week, to hear the report of the special committee on foundry regulations, appointed some months ago by the state industrial commission, promises to be an event of importance in promoting the safety first movement. Mr. Noonan, safety director of the industrial commission, believes that at least half of the 80,000 accidents that occurred in the state last year could have been avoided. Under the enlarged powers granted the industrial commission, much can be accomplished by the employers and employes working together in making their own factory regulations and the movement of the foundrymen and their em-

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ployes in this direction is worthy of hearty commendation.

Increased Production of Basic

AN extremely interesting article in *The Daily Iron Trade* of April 22 shows that the percentage which merchant pig iron is of the total production of all kinds of pig iron has declined from 41.9 per cent in 1903 to 29.2 per cent in 1914. In January of this year, the merchant furnace output was 30.9 per cent of the total production; in February, it declined to 27 per cent, and in March it was only 25.1 per cent, while for the entire first quarter of this year the merchant furnaces produced only 27.4 per cent of the total pig iron production of the country.

The unusually poor showing made during the past three months by the merchant furnaces may be attributed to the very decided increase in demand for steel products for export to foreign countries, but another explanation must be found for the steady downward trend from 1903 to 1914 of the percentage of merchant production. One explanation which immediately presents itself is the increasing tendency to have self-contained plants in which both pig iron and steel are made, but this is not a complete explanation, and it is important to note that the production of basic pig iron, a very large percentage of which is not made by merchant furnaces, has increased very rapidly since 1903, while other grades have failed to keep pace with it. The production of basic for 1914 was 9,670,687 tons, a gain of 7,629,961 tons, or 307 per cent, compared with 1903. A comparison of 1903 with 1913 is even more impressive, for in the latter year the production of basic was 12,536,693 tons, a gain of over 500 per cent over 1903. The production of bessemer, comparing 1903 with 1913, shows a gain of 16 per cent, but comparing 1903 with 1914, there was a loss, the tonnage being 9,989,908 in 1903 and 7,859,127 in 1914. But bessemer, like basic, is made principally by furnaces connected with steel plants. The production of foundry grades in 1903 was 4,409,023 tons, and in 1913 it was 5,220,343 tons, an increase of 18 per cent, but comparing 1903 and 1914, there was a gain of only about 3 per cent. The production of malleable increased from 473,781 tons in 1903 to 993,736 tons in 1913 and 671,771 in 1914. This large increase could not, however, offset the very large gain made in basic and it is clear that the decline in the relative tonnage of merchant pig iron can be attributed largely to the great popularity of basic.

What Will He Do?

THE American Federation of Labor now is squarely confronted with the question whether it will deal squarely and fairly with the Danbury hatters against whom fines aggregating $250,000 are about to be enforced in accordance with the final decision of the supreme court of the United States, in which it was held last January that members of a union which engages in a boycott are responsible for the acts of the officers.

In a letter to the *Danbury News,* Mr. Loewe has given warning that his attorneys are about to proceed to collect on the judgment, and he points out very clearly that the American Federation of Labor, as well as the United Hatters of America, is morally obligated to come to the assistance of the hatters. No personal ill-will toward the hatters has been shown by Mr. Loewe, and certainly there has been no undue haste, but, in order fully to establish the principle of the illegality of the boycott, and to prevent boycotting for all time, the fines must be collected.

Mr. Gompers cannot escape his moral obligation by hiding behind the technicality, that he has no authority to proceed in this matter. Probably he has no authority to pay the money from the treasury of the Federation, but if he could raise $230,000 for the defense of the Los Angeles dynamiters, he could at least make an attempt to raise a like amount to liquidate the fines assessed against the Danbury hatters. Certainly these hatters are more worthy of support than were the dynamiters and we believe that an appeal by the American Federation of Labor to its members would meet prompt and liberal response.

Prices Present and Past

Quotations on leading products April 28, average for March, 1915, average for January, 1915, and average for April, 1914. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Apr. 28. 1915.	Average for Mar., 1915.	Average for Jan., 1915.	Aver. for Apr. 1914.
Bessemer pig iron, Pittsburgh..	$14.55	$14.55	$14.70	$14.90
Basic pig iron, Pittsburgh.....	13.45	13.45	13.45	13.90
No. 2 Fdy. pig iron, Pittsburgh	13.45	13.80	13.70	14.15
Northern No. 2 Fdy., Chgo....	13.00	13.00	13.00	14.25
Lake Superior Charcoal, Chgo..	15.75	15.75	15.75	15.50
Malleable, Bessemer, Chgo.....	13.00	13.00	13.00	14.25
Southern No. 2, Birmingham...	9.50	9.50	9.50	10.50
Southern Ohio No. 2, Ironton..	12.75	12.75	12.75	13.50
Basic, eastern Pa.....	13.25	14.00	13.50	14.25
No. 2X Virginia furnace.....	12.50	12.50	12.50	12.75
No. 2X foundry, Philadelphia..	14.25	14.25	14.25	15.00
Ferro mang., Balt.. (prompt)...	100.00	100.00	68.00*	38.00
Billets, Pbgh.	19.00	19.50	19.50	20.80
Sheet bars, Pbgh.....	20.00	20.00	20.00	21.60
Steel bars, Chicago.....	1.39	1.34	1.29	1.33
Steel bars, Pittsburgh.....	1.20	1.10	1.10	1.15
Iron bars, Philadelphia.....	1.17	1.125	1.12	1.22
Iron bars, Cleveland, local del'y	1.20	1.15	1.15	1.20
Iron bars, Chgo. mill.....	1.15	1.10	0.98	1.15

*Nominal.

	Prices Apr. 28. 1915.	Average for Mar., 1915.	Average for Jan., 1915.	Aver. for Apr., 1914.
Beams, Chicago	$1.34	$1.34	$1.29	$1.35
Beams, Pittsburgh	1.20	1.15	1.10	1.18
Beams, Philadelphia	1.359	1.25	1.25	1.30
Tank plates, Pittsburgh.....	1.15	1.125	1.10	1.15
Tank plates, Chicago.....	1.34	1.34	1.29	1.32
Tank plates, Philadelphia.....	1.359	1.25	1.25	1.30
Sheets, blk., No. 28, Pittsburgh	1.80	1.80	1.80	1.92
Sheets, blue an., No. 10, Pbgh..	1.30	1.30	1.30	1.40
Sheets, galv., No. 28, Pbgh....	3.40	3.40	2.77	2.92
Wire nails, Pittsburgh.....	1.55	1.60	1.51	1.60
Connellsville fur. coke contr....	1.65	1.65	1.69	2.00
Connellsville fdy. coke, contr...	2.25	2.25	2.25	2.50
Heavy melting steel, Pbgh.....	11.75	12.00	11.55	12.00
Heavy melting steel, east'n Pa.	11.25	10.50	9.50	11.50
Heavy melting steel, Chgo.....	9.25	9.75	8.87	9.50
No. 1 wrought eastern Pa.....	12.50	12.00	11.50	13.00
No. 1 wrought, Chgo.....	8.50	9.00	8.80	8.50
Rerolling rails, Chgo.....	10.00	10.00	9.50	11.25
Car wheels, Chgo.....	9.75	10.00	10.00	11.00

(For Additional Prices See Page 892.)

Basic Buying is Leading Feature

Youngstown Company Takes 50,000 Tons and Other Consumers Smaller Tonnages —Low Prices Continue to Appear in Philadelphia District

Pittsburgh, April 27.—The Youngstown Sheet & Tube Co., Youngstown, which headed the last previous steelmaking pig iron buying movement almost two years ago, has closed for 50,000 tons of standard basic and 10,000 tons of gray forge pig iron for shipment to Oct. 1. While no definite announcement has been made relative to prices, it is understood the basic was sold on the basis of about $12.50, valley, and the gray forge was obtained at a shade less than $12.25, valley. The iron involved will be furnished by W. P. Snyder & Co., the Ohio Iron & Steel Co. and the Andrews & Hitchcock Iron Co. The Snyder company has sold another block of standard bessemer, involving 10,000 tons, for foreign shipment, probably to Italy, at a price equivalent to $13.86, furnace, or 26 cents above the market for domestic trade. Approximately 16,500 tons of bessemer pig iron have been sold for export to Italy. Rather general interest is manifested in the basic pig iron market. The United Steel Co., Canton, O., has purchased a block; the Central Steel Co., Massillon, O., is understood to have taken 1,000 tons for nearby shipment, and the American Rolling Mill Co., Middletown, O.; the Newport Rolling Mill Co., Newport, Ky.; the Portsmouth Steel Co., Portsmouth, O., and the American Steel Foundries, operating plants at Alliance, O., and Sharon, Pa., have been actively figuring needs and some have bought. The American Steel Foundries has taken 10,000 tons of basic for consumption at St. Louis, and may buy a similar tonnage for equal shipment to its Alliance and Sharon plants. At least three consumers in the immediate district are expected to figure in the market at an early date, to cover second half needs. While consumers may not figure actively in the market for a fortnight or longer, blast furnace managers appear certain the future will be much more satisfactory from a remunerative standpoint than the last six or 12 months. Foundry iron sellers have enjoyed a moderate increase in activity, but no large sales are reported. The leading maker of sanitary ware and a prominent machine company have been taking small lots at about prevailing prices.

More Buying, Lower Prices

Philadelphia, April 27.—A wider distribution of buying and the continued appearance of low prices especially in foundry iron are the outstanding points of interest of the market in this territory. Consumers of steel making grades especially have been showing more confidence in the future by buying or inquiring for good tonnages for forward delivery. A 13,000 ton sale of low phosphorus, delivery to begin at once, was made by a Lebanon district maker to an eastern steel company. Another middle western steel company recently inquired in the east for 10,000 to 12,000 tons of low phosphorus for forward delivery, but decided not to buy this block at present. Smaller sales of this grade are being done and there continues considerable export demand, but the specifications and prices offered on the latter are not satisfactory to makers. Low phosphorus prices are at $19 to $20, Philadelphia, for standard and at $16 to $16.50, furnace, for Lebanon grades. In basic, a Phoenixville, Pa., works asks 3,000 tons for May-July shipment and another steel company in this territory is reported to be negotiating after the recent low prices on the basic sold to a Coatesville consumer. The market on smaller tonnages is not so certain, but probably is around $13.25 delivered eastern Pennsylvania. In foundry iron a price of $14, delivered, for No. 2X came out this week, which is the lowest that has been done in this grade in some months and is 25 cents under the recent general market level. This figure was done by an eastern Pennsylvania maker on 500 tons for third quarter purchased

(*For complete prices see page* 892.)

by a Philadelphia builder of engines. It is understood that at least three prices under $14.25 delivered were quoted on this business. The $14.25, delivered price for No. 2X has been freely done the past several weeks on miscellaneous lots. Such sales the past week included 500 to a Philadelphia foundry for last half and smaller lots. A Kutztown, Pa., consumer recently bought 2,000 to 3,000 tons, of which part at least was at that figure. Other sales of the week included 600 tons of mill forge at around $13.25, delivered, and 1,200 tons of charcoal. Included in the recent round purchases of Lynchburg, Va., pipe works previously reported, were single lots of 6,000 tons of southern and about 5,000 tons of Virginia iron. Virginia iron is not active. The schedule of $12.50, furnace, remains unchanged.

Charcoal Iron Active

Buffalo, April 27.—Charcoal iron continues to be the active feature of the Buffalo district pig iron market. Sales in good volume are being made with prices, for ordinary grades, holding to $15.75 to $17.25, as previously reported, while some of the special grades are bringing $19 to $20.

In the other lines, the market has quieted down to small inquiries and moderate placements for foundry grades, with the exception of a single inquiry for a considerable tonnage of foundry iron for delivery over last half.

Malleable shows little demand. The reported placement of 6,000 tons went to a Pennsylvania furnace interest and not to Buffalo producers. The price is holding at $13 as the minimum price at the furnace.

Producing interests report that the filling in character of the inquiry and buying represents the immediate situation, while the general business condition seems to be assuming a more substantial character as the season advances. The process of improvement is slow, however, and a period of tedious waiting is expected before activities will again assume normal proportions. Some of the consuming interests are being crowded to capacity on war order specialties, but the industries of the district not engaged in this class of work are, in many cases, taking less material and operating on a lower basis than at this time a year ago. Some plants are practically closed down.

Sold Basic

Cleveland, April 27.—One Cleveland company and one Cleveland agency participated in the selling to the United Steel Co., Canton, which purchased from 10,000 to 15,000 tons of basic. Details as to the transaction are not known. While sales during the month have not been of large volume, the aggregate promises to compare very favorably with last month. Shipments continue to go forward satisfactorily.

Sales Strengthen Prices

Cincinnati, April 27.—A better feeling is noticeable in the pig iron market, and conditions point to a general advance in prices. Sales are considerably heavier than inquiries, as melters are usually buying secretly, or through solicitation by salesmen. The American Rolling Mill Co., Middletown, O., has purchased between 6,000 and 8,000 tons of southern basic iron from the Tennessee Coal, Iron & Railroad Co., and the Hercules Engine Co., Evansville, Ind., has taken 3,500 tons divided between northern, southern and charcoal grades. The Huber Mfg. Co., Marion, O., has bought 1,000 tons of northern foundry iron and 3,000 tons of northern and southern foundry iron has been taken by a central Ohio manufacturer. The Portsmouth Steel Co., Portsmouth, O., is inquiring for 500 tons of mixed iron, and a Wheeling, W. Va., melter wants 1,000 tons of northern and 300 tons of southern iron. Two inquiries of 1,000 tons each are pending from northern Indiana and Pomeroy, O. A Canton, O., manufacturer is asking for 800 tons of northern iron. Two southern interests have advanced quotations for the fourth quarter to from $9.75 to $10, Birmingham basis, for No. 2 foundry iron, but $9.50, Birmingham basis, can still be done for the last half. Southern Ohio No. 2 foundry is being held at $12.75, Ironton basis. Demand for malleable iron is low in this territory.

Much Activity at Chicago

Chicago, April 27.—Increasing inquiry and larger sales of pig iron mark the present situation in Chicago. More inquiry is being received for third quarter and last half than for immediate delivery, as most users are covered until the middle of the year. Estimates as to the total tonnage disposed of within the last 10 days place it between 50,000 and 80,000 tons of northern iron and considerable tonnages of southern have been contracted in this territory as well.

A sign of even greater significance is the fact that melters covered by contracts are asking shipments and taking a larger proportion of their iron for some time past.

Federal Furnace Co., South Chicago, will blow in its A stack April 29 after it has stood idle since September, 1914. While idle the stack has been relined. Stack B of the Federal furnace has not been active since July, 1913.

Some little activity has been noted in the market for basic iron and American Steel Foundries recently closed for about 10,000 tons, divided between northern and southern producers. The northern tonnage was taken by a non-merchant stack and the price is said to have been about $13.75, delivered, St. Louis. The tonnage of southern basic is said to have been obtained at $12.90, delivered, St. Louis. About the same time the Grand Crossing Tack Co. closed on an inquiry for about 5,000 tons of basic at about the same price level.

Northern makers are holding No. 2 foundry and malleable at $13, Chicago furnace, for immediate delivery and third quarter, with 50 cents premium for last half. Particular insistence is made on observance of the silicon content and these quotations apply to 2.50 silicon with the usual premiums for additional quantities.

Considerable inquiry remains in the hands of sellers, principally for third quarter and last half, and in this is represented more activity by malleable melters than has been observed for some time. The malleable business seems to be more prosperous in some spots than others, makers of castings for automobiles and tractors having much more business than those who depend on railway equipment builders.

Southern iron is more active and better sales are being made than for several months. Within the past fortnight, some sales have been closed on a basis of $9.25, Birmingham, for No. 2 foundry, but the market apparently is steady at $9.50, Birmingham, sales at a lower price having some considerations which prevents the price being regarded as a true exponent of the market.

Much More Cheerful

Birmingham, Ala., April 27.—Another order, this one for 5,000 tons, is reported closed this week at $9.75. Four of the largest operators in the district are said to have already sold more than their makes for the month of April. Inquiry is good and is coming more from the general trade rather than from the large pipe makers and big consumers as was the case until recently. Considerable iron is being bought at $9.50 and held for a contemplated rise in prices by speculators, it is said.

Reports have been circulated here that the total sales for the month would be 200,000 tons or over and

(*For complete prices see page* 892.)

while this is not established, it is believed that the total sales for April will be larger than for any of the past several months. Many makers are more inclined to optimism than any time since the war started.

Purchase of Basic

St. Louis, April 26.—The purchase by the American Steel Foundries of 10,000 tons of northern basic iron last week is the largest transaction in the local iron market for some time, and has caused local agents to believe that business is picking up.

Inquiries in the market today are restricted to small lots and prices have undergone no change since last week. Southern pig iron is quoted at $9.50, $9.75 and $10, Birmingham, with a freight rate of $3.40. Northern iron is offered at $13, Chicago and Ironton.

Sales Make Large Tonnage

New York, April 27.—Quiet sales of iron aggregating at least 100,000 tons, have been the most striking development of the iron market in this territory recently. Few details of some of these transactions now are known. A Troy, N. Y., buyer, however, closed for 15,000 to 20,000 tons of standard forge iron for forward delivery with a Buffalo maker at $12, furnace. Other round lots have been closed. There continues to be considerably more figuring being done and more willingness on the part of consumers to cover on their forward needs. Small orders are more numerous and prices, if anything, are a little firmer. Among pending inquiries is one of 4,000 to 5,000 tons of foundry for a consumer in this district which is being figured quietly; 600 to 800 tons for the New Jersey Zinc Co., Hazard, Pa.; 700 to 800 tons for a Brooklyn buyer, 1,000 tons of malleable for a railway equipment maker for Michigan delivery and others. Prices on northern iron at tidewater remain $14.25 to $14.50, for No. 2X and $15.25 to $15.75, in New England. A pipemaker bought 5,000 tons of southern. There has been more selling of southern iron at $9.50, Birmingham, and at least one large seller is talking $9.75, for early, and $10, for late year delivery. Little has been done in iron for export the past week, though new inquiry still comes out. The inquiry for 10,000 tons for No. 2 southern soft for Italy, reported a week ago, is being bid for quite actively by Alabama sellers and seems likely to develop into a sale. It is reported the buyer has offered the furnaces slightly under $9.25, Birmingham, but that higher is wanted.

Ferro Arrives

Four Lots Aggregate More Than 1,000 Tons —Larger Tonnages Coming

New York, April 26.—Four separate lots of ferro-manganese, at least, aggregating more than 1,000 tons, have arrived at eastern ports within the past week or more, as the forerunner of the resumption from England of shipments against merged contracts with consumers in this country. The Swanmore, which came in at Baltimore, brought 660 tons; the Scottish Monarch, at Philadelphia, 100 tons; the Dominion, at New York, about 200 tons, and the Lord Sefton, 100 tons. With the approximately 1,000 tons which came in recently, especially for an eastern Pennsylvania steel works, engaged in manufacturing war munitions, these lots make total deliveries of about 2,000 tons in about 30 days. Larger quantities are afloat and aggregate some thousands of tons. The Appenine, which is due to arrive in about a week, as far as known, will have the largest single shipment, 3,000 tons or more, which will come from east coast works. These arrivals are part of the April quotas for which licenses recently were issued by the English government. Some further licenses now have been granted for May delivery which indicates a continuous movement for the time being at least.

The material which arrived this week was passed immediately to the general trade through the firm of Marwick, Mitchell & Peet, New York City, who have been especially delegated to represent the English government in this matter. The procedure followed in releasing ferro-manganese to the trade includes a personal inspection of the shipment at the docks by a representative of the New York firm, the supervision of the loading of the alloy on the cars consigned to steel makers who have pledged themselves to the conditions imposed by the English government and finally by the taking of a receipt for the shipment from the consumer upon arrival at the latter's plant.

Some difficulty still is being encountered in the signing by consumers of the formal pledges required by the English government due to the latter's objections to the clause which makes it necessary for them in turn to obtain agreement from their customers not to export any steel made from this ferro-manganese. This clause is regarded as too sweeping and unelastic in its present form and to be practically impossible of strict observance. An effort is being made to have the English government representatives in this country granted more discretionary power in this matter. Some steel companies still refuse to subscribe to the pledge in its present form.

Some consumers of ferro-manganese now appear to be suffering more keenly from short supplies so that the arrival of shipments from abroad is opportune. Spot ferro-manganese still is around $100 and an eastern Pennsylvania steel company, which has made up some tonnage, has quoted this figure on inquiries. The forward price continues to be $78, seaboard.

Bessemer ferro-silicon has been selling at low prices in the east. An eastern Pennsylvania steel maker took 300 tons of 11 per cent for last half at $17, Ohio furnace. A Philadelphia steel maker now is out for 300 tons of 11 to 12 per cent.

Lower Grades Decline

Pittsburgh, April 27.—A steel casting interest and a maker of finished steel products have taken 900 and 600 tons, respectively, of lower grades of ferro-silicon for shipment the remainder of the year, at about $17, furnace, for No. 11 per cent. This is the lowest figure to prevail for a long time. No. 12 to 13 per cent ferro-silicon is quoted at $18.50, furnace, by some makers. No change is noted in the situation for 50 per cent ferro-silicon. Ferro-manganese is quiet and no important price changes are reported. Spiegel is displaying slight weakness, sales at less than $25, furnace, being reported. Demand for ferro-tungsten, ferro-malybdenum and ferro-carbon titanium is limited to small lots and no change in prices is noted.

(*For complete prices see page* 892.)

Mr. Kennedy is Recovering

Buffalo, April 27.—Hugh Kennedy, vice president and general manager of the Rogers-Brown Iron Co., injured in an accident at the company's Susquehanna furnaces on Thursday, April 22, is reported doing as well as could be expected under the circumstances. Mr. Kennedy in falling from a stock larry sustained severe lacerations of one limb below the knee and painful bruises to the other lower limb. The instant stopping of the stock car saved Mr. Kennedy's life.

Since the accident, Mr. Kennedy has been a patient at Dr. Vertner Kenerson's private hospital here. Dr. Kenerson said this evening that Mr. Kennedy is progressing as favorably as could be expected. No bones were broken and no complications have arisen. Mr. Kennedy's injuries will require careful treatment for some time.

More Inquiry for Bars

Agricultural Implement Makers Showing More Interest —Prices Firm Except on Reinforcing Bars

Pittsburgh, April 27.—Makers of agricultural implements are inquiring more actively for material and actual orders are expected to be placed the early part of May. Bars are being firmly held at 1.20c for second quarter shipment, and every possible effort is being made to maintain that figure, despite severe tests expected the next few weeks. Conflicting reports concerning shrapnel orders continue to confuse market observers; so far as can be learned, no new contracts have been placed with mills here. The Wheeling Mold & Foundry Co. has taken a sub-contract for machining rounds for shells.

Not Contracting After July

Philadelphia, April 26—Buyers of steel bars in this district at this time are showing no inclination to place contracts for third quarter at 1.25c, Pittsburgh, or 1.409c, Philadelphia, which some important makers now are quoting. A number of these buyers, especially those among the consuming trade, now are operating on 1.15c contracts, so that the third quarter price is virtually a $2 advance. It is not likely there will be any considerable contracting at the higher figure until later in the present quarter. Specifications against steel bar contracts in this district are a little better. New business still is moderate, but on this the 1.20c, Pittsburgh price is being firmly maintained by all the larger makers. An inquiry is current for 250 tons of 1-inch squares for a Cambridge, N. J., buyer, and some smaller new lots are out. Wm. Steele & Co., Philadelphia, have the general contract for an extensive new plant for the Campbell Soup Co. along the Delaware river below Camden, which will require a round tonnage of reinforcing bars.

Lively Competition

Cleveland, April 27.—Lively competition continues in reinforcing bars, owing to the low prices made by rerolling mills, but on soft steel bars, the 1.20c, Pittsburgh, price is being well maintained. Mills are conservative about contracting after July 1.

Lull in Steel Bars

Chicago, April 27.—Specifications for soft steel bars have fallen off recently as agricultural implement makers have filled their requirements for the present season. As railway equipment makers evidence little interest in present requirements, such buying as is being done is in small tonnages and for the most part is taken only when an immediate outlet is seen. Stocks in the hands of consumers here are unusually low and no tendency is seen toward accumulating stocks for future needs.

Prices for immediate delivery are maintained without difficulty at 1.39c, Chicago mill, bars being the firmest finished steel product. Some tentative interest is being shown on the part of agricultural implement makers as to price for the year beginning July 1, but makers have not announced the program of prices and the situation has not received a test.

With 60 days intervening before the middle of the year, both buyers and sellers believe it is too early to decide on a price schedule until future developments outline this more clearly.

Prices Firm at Buffalo

Buffalo, April 27.—The mills and agencies of the Buffalo district are holding firmly to the second quarter price of 1.20c, base, on bar material. There is no apparent disposition on the part of sellers to quote for third quarter needs, preferring to wait at least until the middle of next month before doing so. The demand on mills for deliveries indicates that many of the consumers are low on stocks and that the material being ordered out is going into consumption. Some of the mills are finding it difficult to satisfy customers on the matter of deliveries being asked.

Small Bar Iron Demand.

Chicago, April 27.—Demand for iron bars continues slack and mills in this territory are operating only part time. Buying seems to be entirely hand-to-mouth and tonnages are small without particular effort on the part of buyers to break the market. The price here remains steady at 1.15c, Chicago mill, and no shading is evident. Mills for the most part have sufficient tonnage booked for only a week's operation and nothing large is in sight.

War Business Pending

New York, April 27.—No awards of the round tonnage of bars or other steel which will be required for the large foreign steel contracts held jointly by the American Locomotive Co., the New York Airbrake Co. and the Westinghouse interests yet have been made though the steel makers are actively figuring on these lots. No statement of the full details of this large contract has been given out by these companies, but it now is admitted officially that the contract has been placed and is substantially as previously given by *The Iron Trade Review*. A full statement is expected soon. The contract, as stated previously, it is understood, amounts to about $70,000,000, of which half goes to the American Locomotive Co. and the remainder to the other companies. This contract, which now is said to have been placed through J. P. Morgan & Co., in behalf of the English government, has no connection whatever with the large contract recently taken by the Canadian Car & Foundry Co. and sublet to numerous companies in this country, and is totally distinct from that matter. Shrapnel and ammunition contracts have caused less stir in the bar market the past week. In the usual lines of the bar trade, conditions are not especially active and specifications still are a little backward. Prices are uniform at 1.20c, Pittsburgh, or 1.369c, New York. R. W. McPhee, 90 West street, New York, is inquiring for 22,000 pounds of cold rolled strip steel of various gages for export to Spain.

(*For complete prices see page* 892.)

Warehouses

Advance Quotations at Philadelphia—Lower at Baltimore

Philadelphia, April 26.—An advance of $1 a ton to 1.70c, delivered, for plates, shapes and steel bars, has been put into effect by the warehouses in the Philadelphia district. This advance is due to a better demand for material and to the higher mill prices. Bar iron from store has not been affected and is slow at about 1.55c, delivered. In Baltimore, exactly the reverse condition prevails as because of a backward market and sharp competition, shapes, plates and bars recently were lowered $1 a ton to 1.60c, delivered. Warehouse bar iron prices at Baltimore are weak and 1.40c to 1.45c, delivered, recently has been done.

Warehouse Business Brisk

Chicago, April 27.—Although labor troubles in Chicago have affected demand for structural materials to some degree, inquiry for other warehouse materials continues brisk and business for April promises to exceed that for March to a considerable degree.

Surprising Sheet Prices

On Galvanized Product—Concessions Made in Spite of Very High Quotations on Spelter

Pittsburgh, April 27.—The sky-rocketing tendency of spelter should steady the market for galvanized steel products, and most makers of galvanized sheets have been quoting 3.40c and above for base size, and some manufacturers have withdrawn from the galvanized market altogether. On the other hand, surprisingly low quotations continue to crop out; sales of galvanized steel sheets as low as 3.25c for No. 28 gage were made last week when spelter was listed at 11.50c and above, according to delivery. Blue annealed sheets have reflected moderate strength, numerous sales at 1.40c for No. 10 gage being reported. Black sheets are commanding as high as 1.90c for base size, but this grade still shows signs of uncertainty. Black and painted sheets are being recommended by some makers as substitutes for galvanized products, because of the high price of spelter.

The United Iron, Steel and Tin Workers of America, composed largely of former members of the Amalgamated Association, has been organized by sheet and tin plate workers in the Wheeling district, with the following officers: President, Robert Edwards; vice presidents, Thomas J. Craig, Harry Griffith, Harry Woeber and John Jacobson; secretary and treasurer, William Holloway; national organizer, William Edwards. The new organization will include members from all crafts of the steel industry, officers announce.

Price Steadiness Helps Orders

Philadelphia, April 26.—Firmness of the contract minimum at present on blue annealed sheets at 1.30c, Pittsburgh, for No. 10 gage, is resulting in the continuance of reasonably good specifications to eastern Pennsylvania mills. Car builders and automobile manufacturers continue to draw well against their contracts. There also is a fair amount of new business moving with the result that eastern mill operators are keeping to a full basis. A Cumberland, Md., buyer has been inquiring for some quantity of Nos. 22 to 10 gage. Pacific coast trade remains quiet.

Shading Galvanized

Cleveland, April 27.—There is a fair demand for sheets and prices on black and blue annealed are well maintained at recent quotations. The rather remarkable feature of the situation is that reports of shading on galvanized sheets to less than 3.30c, Pittsburgh, are heard in spite of the high price of spelter. The making of low prices is attributed to some companies which expect to go out of the business of making galvanized sheets as soon as they exhaust their supply of spelter, until the spelter situation becomes more settled. An interesting example of unusual demand for sheets is furnished by the recent exporting of 300 to 400 tons of sheets to Canada for use in manufacturing army saddles to be used in the European war.

Sales Light

Cincinnati, April 27.—Sales of sheets are light, principally because of the uncertainty of prices, and the unwillingness of rolling mills to sell galvanized sheets except for prompt delivery. Quotations on galvanized sheets have advanced slightly, being now given at from 3.40c to 3.50c, Pittsburgh basis, for 28 gage. Black sheets No. 28 gage are being held at from 1.80c to 1.85c, Pittsburgh basis, on deliveries to extend through the second quarter. Books have not been opened for third quarter business by rolling mills, despite the fact that a slight demand is developing for black sheets for delivery beyond July.

Galvanized Are Higher

Chicago, April 27.—With the leading independent maker of sheets in this market refusing to take business at present prices for galvanized, a nominal quotation of 3.59c, Chicago, is carried, mills in Ohio being willing to take some tonnages on this basis.

Blue annealed sheets are somewhat lower, being obtainable as low as 1.49c, Chicago mill, while black sheets, No. 28 gage, are quoted at 1.94c, Chicago mill, with rumors of 1.89c being obtainable.

The spelter situation is such that makers of galvanized sheets are unwilling to contract except on an ironclad basis and many are unwilling to take any business at prices which can be obtained at present. Rumors are heard that some galvanizing plants will close down when present contracts are worked out unless spelter prices become steady or lower before that time.

New Tin Plate Capacity

Pittsburgh, April 27.—The McKeesport Tin Plate Co., McKeesport, Pa., will award contracts shortly for 20 additional hot mills and necessary equipment, which will almost double present capacity. The Wheeling Sheet & Tin Plate Co., operating 10 hot mills at Yorkville, O., will add two hot mills at an early date. The Standard Tin Plate Co., Canonsburg, Pa., is contemplating an extension, but definite plans have not been completed, officers state. Tin plate mills are operating at practically maximum capacity, but no change in the situation is noted.

(*For complete prices see page* 892.)

Wire Mills

Are Very Busy and Buyers Are Urging Prompt Delivery

Cleveland, April 27.—Wire mills in the Cleveland district are running almost at full capacity and independent companies having plants in other districts also report great activity with strong demand, and with prices being well maintained. In some cases, buyers are crowding the mills for more prompt deliveries. Some large sales of coated nails have been made in this district during the past few days.

Wire Mills Busy—Prices Unsteady

Pittsburgh, April 27.—Irregularity continues to feature the market for wire products, despite activity. Although most mills are quoting nails on the basis of $1.60 a keg, consumers apparently are having no trouble covering needs at $1.55. Shipments to foreign countries are heavy, but a falling off in new orders is noted.

Nuts, Bolts and Rivets

Pittsburgh, April 27.—A moderate increase in specifications is reported by makers of nuts, bolts and rivets, but the market is far from normal. Circular quotations are maintained generally, but some irregularity is reported in isolated instances. The apparent sound condition of the bar steel market is helping the situation of nuts, bolts and rivets.

Bolt Market Quiet

Chicago, April 27.—The market for bolts and nuts remains quiet with almost no new contracting being done, producers being busy only in filling specifications which are received on contracts made some time ago. Prices remain steady at former levels, being held to a firm standard by lack of fluctuation in bar iron which has not varied for several weeks. The demand for rivets is weak and prices are not strengthening.

Plates for Locomotives

For Pennsy Will Be Furnished Under Old Contracts —Prices Weak in the Central West

Philadelphia, April 27.—Three eastern Pennsylvania plate makers will furnish, under old contracts, as specified during the year, the 5,000 to 6,000 tons of this product required by the Pennsylvania railroad for the 144 locomotives which under its recent announcement it will build at Altoona. The 15,000 tons of plates and 4,000 to 8,000 tons of bars and shapes asked by this system in the open market to cover 2,100 freight cars also to be built in its own shops, are unplaced, though prices have gone in. Nothing has been done on the award to outside builders of the other cars and locomotives in the large Pennsylvania equipment program. Business with eastern plate mills is holding up nicely and appears to be further expanding, with small and miscellaneous orders predominating. Some buyers who have been indifferent now are ordering new lots at full price. There is some inquiry for contracts for third quarter upon which eastern Pennsylvania makers have been quoting 1.25c, Pittsburgh. On the Pennsylvania car plates, some makers have been quoting both to the railroad and to builders a rising scale which is 1.25c, Pittsburgh, for third quarter and 1.35c, for fourth quarter. A number of negotiations for boats remain unplaced in the eastern market. The more than 2,000 tons of plates for the Mallory boat recently placed with a Newport News yard will be supplied by an eastern Pennsylvania mill and the shapes, about 1,000 tons, by a Pittsburgh maker. On such strictly new business as has been placed, on which large orders have been few, 1.20c, Pittsburgh, or 1.359c, Philadelphia, has represented the market.

Still Drag at Pittsburgh

Pittsburgh, April 27.—Steel plates show signs of improvement in some sections of the country; in others, they appear somewhat weak and irregular. Leading mills at this center are asking 1.20c for plates for second quarter delivery, but that figure is being shaded by smaller mills. The Pennsylvania railroad's inquiry, which has been increased to about 28,000 tons, for cars to be built at its Altoona shops, may be closed within the next few days. Inquiries are increasing in number, but actual orders have not improved much.

Very Active Demand

Cleveland, April 27.—The demand for light plates in this territory shows very decided improvement and one important company has advanced its minimum quotation to 1.20c, Pittsburgh, for early delivery. The Hydraulic Pressed Steel Co. has contracted for its requirements of sheets and light plates, estimated at 8,000 to 10,000 tons, for the last half of the year. It is understood that about half of the tonnage went to the American Sheet & Tin Plate Co., while the other half was divided among three or four independent companies.

Plates Continue Weak

Chicago, April 27.—Steel plates continue to be the weakest product in the finished steel market. Larger steel producers are endeavoring to maintain 1.39c, Chicago mill, but considerable competition exists among smaller makers and plates are obtainable on a basis of 1.29c, Chicago mill, without difficulty. Demand for plates is small and such as are being sold appear to be going into tank work, a considerable volume of this business having been for delivery in Oklahoma and Texas oil fields.

Iron Ore Buying is Slow

By Companies Not Affiliated With Producers—Uncertainty as to Effect of Reduction of Rail Carrying Rate

Cleveland, April 27. — Consumers affiliated with the leading iron ore mining and selling companies have taken large tonnages of ore since prices were determined last week, but consuming companies not connected with the ore companies are not buying generally, but are showing a disposition to await developments, as they see no necessity of obligating themselves financially by buying ore at the present time. This attitude was expected and it has not caused any disappointment or apprehension among the ore sellers.

The announcement that the interstate commerce commission has reduced the ore-carrying rate from mines on the Mesabi to ports at Two Harbors, Duluth and Allouez Bay 5 cents was received with keen interest among the furnace operators and ore sellers. Furnace men naturally hope that the price of Mesabi ores will be reduced 5 cents and it is possible that this will be done, but the law of supply and demand usually determines prices and doubtless will do so in this case regardless of the ore-carrying rate, as the prices on Mesabi ore now quoted, $2.85 for non-bessemer and $3.50 for bessemer, are low.

Lake Trade Opening

Lake trade is opening up more rapidly than was expected and a considerable fleet is in commission. By May 15, it is expected that the movement will be general. Practically all of the leading shippers have part of their fleet in commission and expect to have them all going early in May. The ore movement is sure to receive a considerable impetus during May. The feeling is growing palpably better every day and vessel owners are looking forward to an active season after June 15. Freight-carrying charges for coal and ore have been established upon last year's basis and with a good movement the larger ships ought to make a little money. The element of weakness in the trade at present is coal, as not sufficient of it is coming to Lake Erie ports to keep the vessels in commission busy. Several vessels, therefore, that brought grain down on their first trips will have to remain at dock for several days.

(For complete prices see page 892.)

New Members

Twelve new members, four active and eight associate, were elected to the American Iron and Steel Institute, at the monthly meeting of the directors at New York City, April 23.

The new active members are as follows:

John C. Bradley, president, Pratt and Letchworth Co., Buffalo.
Robert M. Donner, salesman, Cambria Steel Co., Philadelphia.
John M. King, Jones & Laughlin Steel Co., Pittsburgh.
P. J. Moran, superintendent, Detroit Iron & Steel Co., Detroit.

The associate members are as follows:

Rodney D. Day, the William Tod Co., Pittsburgh.
William J. Dean, vice president, Nicols, Dean & Gregg, St. Paul.
Roy A. MacDonald, General Refractories Co., Pittsburgh.
Eugene A. McKelvy, General Refractories Co., Pittsburgh.
Roy A. Rainey, Rainey Coke Co., New York City.
Joseph S. Seaman, president, Seaman-Sleeth Co., Pittsburgh.
Burrows Sloan, sales manager, Lebanon Valley Iron and Steel Co., Philadelphia.
Scott Stewart, Rainey Coke Co., New York City.

Scrap Market

Is Quiet in Most Grades—Demand for Very Low Phosphorus

Philadelphia, April 26.—Some special grade conspicuously low phosphorus has been in more demand, but the general quietness of trading in the scrap market in eastern Pennsylvania has not been altered. Chester, Pa., foundries and other consumers have been taking low phosphorus and several thousand tons have been closed. A lot of 1,000 tons of first quality went at about $14.75, delivered, and on continued inquiry, some sellers advanced to $15. Pending inquiries include 1,000 tons for one buyer and 500 tons for another. There remains not much desire either to buy or sell heavy melting steel in tonnage lots. One or two mills have been offering $11.25, delivered, and one consumer it is reported, will pay $11.50. Despite reports of as high as $13.50, delivered, paid for this grade, a small quantity of No. 1 railroad wrought was sold this week with some difficulty at $12.50, delivered. Foreign inquiries for old material have brought no further developments in this territory.

Heavy Melting Demand

Buffalo, April 27.—Some good-sized tonnages of heavy melting steel have been placed in the Buffalo district in the past week. The demand continues good. In the general lines, consumers seem to be taking on more material than in some time, but for early needs. Prices continue to hold as previously quoted. In clean cast borings, while the demand is good, the supply seems to be such that dealers are unable to keep the prices as firm as the other lines in the list. Dealers report that there is not much encouragement in the market situation as to the future. Heavy melting steel is bringing $10.50 to $11.

Marks Time

Pittsburgh, April 27.—The old materials market is quiet. Dealers say they are unable to either buy or sell scrap at prevailing quotations. Heavy melting steel is hovering around $11.75, but dealers will boost prices sharply just as soon as active demand is enjoyed. Other grades are quiet and unchanged in position.

Market Has Slumped.

Cincinnati, April 27.—The scrap market has apparently slid back into another slump. This has been brought about by the fact that melters, during the buying spurt three weeks ago, closed for about all the old materials they will need for several months, and in some cases, for the entire second half. The stocks in melters' yards were also heavy before the buying movement began. Consequently no one is in need at present. A few foundries which did not buy are now taking small lots from time to time, but this effect is too light to be felt. Rolling mills are well supplied on old contracts, and shipment of No. 1 busheling to the American Rolling Mill Co., Middletown, O., has stopped. No changes in prices have occurred since the slight decline of 10 days ago, when a general reduction of an average of 25 cents a ton took place.

Buying is Light

Cleveland, April 28.—Iron and steel scrap brokers expected some business to develop in old material following the activity in the basic pig iron market last week, but found that mills were well supplied with scrap. The seasonal loosening up of material is still in progress and enough is coming on to the market to neutralize any benefits to prices which might have resulted from the general improvement in confidence. Cleveland mills are taking little scrap and new buying is light. Prices are unchanged.

Scrap is Steadier

Chicago, April 26.—Some readjustment in scrap quotations has been made in the past few days, a number of items being lifted to a slightly higher level, although the list in general remains about the same as for the past fortnight. Some additional buying of heavy melting steel has given a better insight into market conditions and has resulted in a slightly higher price being marked on some qualities. Rolling mill grades for the most part are steady, with little buying evident. Brokers are unwilling to sell much of their tonnage at present prices and trading is quiet.

Two railroad lists are now actively before the market, the Chicago, Burlington & Quincy offering 3,000 tons, which includes 600 tons of No. 1 wrought and 400 tons of short rails. The Baltimore & Ohio has issued a list containing about 14,000 tons and in this are enumerated 3,000 tons of No. 1 steel rails, 1,200 tons of No. 1 wrought and 1,000 tons of car wheels.

Prices Weaker

St. Louis, April 24.—The absence of buying leaves the scrap and steel market in an unchanged condition, with prices somewhat weaker. Consumers of melting and rolling mill grades are still out of the market, and while a new industry here probably will begin operations within the next few weeks, it also has been buying ahead and has a large stock of raw material on hand.

Railroad offerings have been rather light the last week, and the only tonnage on the market is 3,500 offered by the Rock Island, of which 500 tons is No. 1 railroad wrought and 300 tons of No. 2 railroad wrought.

Expect Improvement

Birmingham, Ala., April 26.—General conditions in the scrap iron market are good, but there is no marked activity in any line. Prices are remaining almost stationary. Dealers expect an improvement during the next few weeks.

Holding Its Own

New York, April 27.—The old material market is just about holding its own in this territory. New business is of moderate volume but prices show no conspicuous tendency to weaken under a lack of demand and are showing considerable stability. Sellers show much resistance to letting go material at concessions and generally are looking for better things later. Some new sales of heavy melting steel of 1,000 tons or more have been made for eastern Pennsylvania delivery at $11.50, delivered. Sales of No. 1 railroad wrought at $13, delivered, are noted. Heavy cast seems a little easier.

(*For complete prices see page* 892.)

Holds Annual Meeting

The annual meeting of the stockholders of the Joseph Dixon Crucible Co., Jersey City, N. J., was held last week. The number of shares represented at the meeting was 19,519 of a possible 20,000. The following were re-elected directors: George T. Smith, Robert E. Jennings, George E. Long, E. L. Young, William G. Bumsted, J. H. Schermerhorn and Harry Dailey. The officers elected were: George T. Smith, president; George E. Long, vice president; J. H. Schermerhorn, treasurer; Harry Dailey, secretary, and Albert Norris, assistant secretary and assistant treasurer.

Opens Office

Chicago, April 27. — The Matthew Addy Co., successor to Matthew Addy & Co., has opened a sales office at 720 Rookery building, Chicago, in charge of W. W. Fowler, who comes here from the Cincinnati office to take charge of business in this territory. This is the same office formerly occupied by Matthew Addy & Co.

Labor difficulties at one of the mines of the Vesta Coal Co., a subsidiary of the Jones & Laughlin Steel Co., Pittsburgh, have been settled.

Subway Work

And Elevated Extensions Are Principal Awards of the Week

New York, April 27.—Total structural steel awards of about 35,000 tons for strictly local work made an unusually good record in tonnage for the metropolitan territory the past week, but more than two-thirds of this requirement are for subway and elevated extensions. It is of some encouragement, however, that about 10,000 tons of these rapid transit awards covers releases of steel work which was tied up for a number of months in the hands of the general contractors, owing to alien labor uncertainties, etc. In a general commercial way, the structural market in this and contiguous districts is not sharply active, but a better condition is being maintained, as compared with a few weeks ago, and the situation is gaining ground, if anything. Some fair-sized propositions are in the market, but a greater number is blocked at present by financing difficulties. Sales at 1.20c, Pittsburgh, or 1.369c, New York, continue to be made and that figure, while probably not absolutely established, appears more and more to represent the general market.

Shapes Stronger Than Plates

Pittsburgh, April 27. — Structural shapes reflect a better tone than plates. Leading makers here are asking 1.20c for shapes and appear certain that figure will be established firmly. Fabricating shops have taken additional work, inquiries are more numerous, but quotations continue irregular. No large contracts have been taken this week.

Small Orders Still Prevail

Philadelphia, April 26.—Reports on conditions in the structural shape market in this district largely are repetions in that small lot orders prevail and good-sized tonnages are the exception. The total volume is better and seems to be on the increase in a modest way, enabling eastern Pennsylvania mills to operate better and to somewhat improve the sentiments of makers, though the low prices on specifications against old contracts temper their current cheerfulness. A number of projects which involve good tonnages continue in the tentative stage in this territory, at Baltimore and other southeastern centers, but difficulty in financing buildings of a speculative character, which generally is to be observed, is holding back the development of most of these plans. The Pennsylvania railroad continues to buy or inquire almost weekly for small bridges of various sizes and numbers. Because of the fact that the great part of the new tonnage now offered in the market is comparatively small, the price limits of the situation cannot be considered wholly established. The usual current price now quoted is 1.20c, Pittsburgh, or 1.359c, Philadelphia, and any variations from this are unimportant. Until some attractive tonnages are placed, price firmness is likely to occasion some doubt.

Steel Awarded

Cleveland, April 27.—The 950 tons of steel for the new building of the Firestone Rubber Co., Akron, O., awarded last week to the Berger Iron Co., of that city, will be furnished by the Cambria Steel Co. The steel for the addition to be built by the National Acme Mfg. Co., Cleveland, 600 tons, will be largely Bethlehem sections. The Berger Iron Co., Akron, has been awarded 600 tons for the new plant of the Marathon Tire & Rubber Co., at Cuyahoga Falls, O.

Shapes Show Weakness

Chicago, April 27.—Demand for structural shapes is not as great as had been hoped and as a result prices are somewhat weaker than for bars. Tonnages going into industrial and mercantile buildings are comparatively small and labor troubles in Chicago proper promise to tie up construction work for some time unless a solution of the problem is reached shortly. While the leading interest and the larger independents are maintaining their quotation on shapes at 1.39c, Chicago mill, some smaller producers are willing to take tonnage at $1 per ton less. Business placed in the west during the past week aggregates about 3,000 tons, the recreation building and shelter on pier No. 2 in Chicago using slightly over 1,100 tons and the Omaha Grain Exchange building using 800 tons, being the only large items.

Steel for St. Louis Bridge

St. Louis, April 26.—President E. R. Kinsey, of the board of public service at St. Louis, announced Saturday, April 24, that he would on May 10 advertise for bids on 24,000 tons of steel to be used in completing the East St. Louis approach to the municipal free bridge over the Mississippi river at St. Louis.

The steel will be used in the structure of the approach and for laying rails for street car tracks on the upper deck and steam roads on the lower deck. The bridge with approaches is more than a mile long. President Kinsey estimates the cost of the work at $960,000. The amount appropriated is $1,300,000.

(*For complete prices see page* 892.)

CONTRACTS AWARDED.

Bridge work for Pennsylvania railroad, 250 tons, awarded McClintic-Marshall Co.

Track work, 1,600 tons, for new motordrome at Sheepshead Bay, L. I., awarded Lackawanna Bridge Co. Grandstand, 2,500 tons or more, yet to be awarded.

Apartment for Jacob Axlerod, Sixty-ninth street and Broadway, New York City, 1,200 tons, awarded Passaic Structural Steel Co.

Bachelor apartments, 743 Fifth avenue, New York City, 350 tons, awarded Geo. A. Just.

Waite Warehouse, 175th street and Webster avenue, New York City, 900 tons awarded Milliken Bros., Inc.

Reconstruction work on Manhattan Bridge, New York City, 600 tons, awarded Vulcan Iron Works.

Loft building for Fabian Construction Co. on Broadway near Thirtieth street, New York, 800 tons, awarded Passaic Structural Steel Co.

Alterations to Metropolitan Life Insurance Co. building, Madison avenue and Twenty-third street, New York City, 200 tons, awarded Milliken Bros., Inc.

Bridge work for Baltimore & Ohio railroad at Chicago, 1,300 tons, awarded Mt. Vernon Bridge Co.

Bulkhead to pier No. 9 for Central Railroad of New Jersey on North River, New York City, 300 tons, awarded L. F. Shoemaker & Co.

Warehouse for Eagle Pencil Co., East Thirteenth street, New York City, 750 tons, awarded to the W. B. Shafer Co.

Small extensions of elevated railroad construction in Manhattan, New York City, 2,100 tons, awarded by T. A. Gillespie & Co., general contractor, to an independent shop.

Lehigh Valley terminal, Buffalo, N. Y., 1,500 tons, general contract awarded W. Henry Miller, Baltimore.

Warehouse for Brewster, Gordon & Co., Rochester, reinforced concrete construction adopted.

Steel work for five subway and elevated extensions, New York City, 27,000 tons, awarded the American Bridge Co. These include 4,860 tons from the Litchfield Contracting Co. and 12,000 tons from the Intercontinental Construction Corporation on genera. contracts just placed and about 10,000 tons additional from F. L. Cranford, Inc., the Rapid Transit Construction Co. and Booth & Flynn representing sections where the steel work has been pending for some months.

Lehigh Valley Railway Co., passenger and freight terminals, Buffalo, general contract to J. Henry Miller Co., Inc., Baltimore. Large tonnage structural.

Brewster-Gordon Co., wholesale warehouse, Rochester, 250 tons reinforcing material, general contract to E. K. Fenne Co., Syracuse.

Sheepshead Bay Racetrack structures, Long Island, N. Y., 4,000 tons structural, contract to Lackawanna Bridge Co., Buffalo; also 100 tons for New Process Gear Co.'s building, Syracuse.

Building for Marathon Tire & Rubber Co., Cuyahoga Falls, O., 600 tons, awarded to the Berger Iron Co. Carnegie steel will be used.

City of Chicago, recreation buiding and shelter pier No. 2, Chicago, 1,143 tons, to Morava Construction Co.

Omaha Grain Exchange building, Omaha, Neb., 806 tons, to Omaha Structural Steel Co.

Miscellaneous castings for Inter - State bridge, Vancouver, Wash., 285 tons to Smith & Watson.

Texas & Pacific R. R. crossing for the Dallas terminal, Dallas, Tex., 273 tons to American Bridge Co.

Addition to Littlefield building, Austin,

Tex., 229 tons, to Reinhardt & Donovan, Oklahoma City, Okla.

CONTRACTS PENDING.

Three small bridges for Pennsylvania railroad, 250 tons, bids being taken.

Office building for Degnon Contracting Co., Long Island City, 1,000 tons, bids being taken.

Ford Motor Co.'s service building, Buffalo, taking 484 tons structural, bids go in April 30, Albert Kahn, architect, Lafayette Boulevard, Detroit, Mich.

Studio building, Rochester, F. L. Greene and associates, 250 tons structural, bids being taken.

Factory building, Cleveland, to be awarded by George S. Ryder, 700 tons.

Rail Tonnage

For the Pennsy Will Soon Be Placed—Rock Island in the Market

New York, April 27.—While distribution of the main lot of the Pennsylvania railroad's rail requirement for 1915 was not made today, as had been expected in some quarters, it is indicated that this action will be taken within a few days, probably this week. Details as to the tonnage and as to the division among the various mills not yet are available. The Rock Island railroad has put out an inquiry for 35,000 tons of rails and is expected to close soon. Among new orders for rails placed are 5,000 tons for the Minneapolis & St. Louis, and 3,000 tons to the Chicago, Indianapolis & Louisville to the Illinois Steel Co., and 2,500 tons for Westchester county, N. Y., traction lines, divided between the Pennsylvania Steel Co. and the Lorain Steel Co. The Pennsylvania Steel Co. in the week also booked 700 tons of scattered rail orders.

Nothing of much importance has occurred in the railroad equipment market since the issuance of heavy inquiries recently by the Pennsylvania railroad system. The Pennsylvania lines west in the week added 500 box cars to their inquiry, increasing it to 6,900, and the total of the Pennsylvania system to 16,725 cars. The St. Louis, Troy & Eastern has ordered 300 gondolas from the American Car & Foundry Co., and the New York Municipal Railways Corporation has placed 100 coach bodies with the same builder. The inquiry of the Virginian railways for 500 underframes still is pending.

In locomotives, an interesting matter is the revival of an inquiry for 100 large locomotives for France, for which complete specifications now have been received. Locomotive business still is poor and few orders are being placed. The Illinois Central has placed four Mikado types with the Lima Locomotive Corporation. The Baldwin Locomotive Works has taken one for the Algoma Lumber Co. and one for the Black Hills & Western railroad. The inquiries of the Chesapeake & Ohio for 20 and the Western Maryland for 10, still are open. The 10 for the Seaboard Air Line are inactive. The government is inquiring for 1,000 kegs of standard spikes for the Panama canal.

Spelter Prices

Continue to Advance—Demand Greater Than Supply

New York, April 27.—Prices in the spelter market continue to ascend to previously unknown levels and there is nothing in sight to indicate when this upward movement will come to an end. The great strength of the market is due simply to the fact that the demand is far greater than the supply. There are urgent requirements both here and abroad which, apparently, cannot be covered, owing to the extent to which producers are sold ahead. Domestic consumers have a great deal of spelter to buy for spot and nearby consumption, but are unable to obtain it and it is considered likely a serious situation may develop shortly at some consuming plants, particularly those of galvanizers. The feature of interest just now is that a great many consumers are showing greater willingness to buy into the future even at present prices, and some of the tonnages closed the last few days cover delivery as far ahead as next October and November. This applies both to foreign and domestic consumers. Prime western now is quoted about as follows: Spot and May 13.25c to 13.50c, June 12.75c to 13.00c, July 12.25c to 12.50c, August 12.00 to 12.25c, September 11.75 to 12.00c, all St. Louis. At least two galvanizers have contracted for considerable tonnages for July, August and September at a blanket price of 12c, St. Louis. Some good sized tonnages of brass special have been sold for both export and domestic shipment over the next few months at 14.50c, St. Louis, and some sellers are holding for higher. The London market has advanced to the unprecedented figure of £59, which still is below our market.

The copper market is advancing in the same spectacular way as is the spelter market, and so big is the demand and so firm are the underlying conditions record prices are considered as being a probable development of the not far distant future. Electrolytic is held at 18.62½c, delivered 30 days, and some first hands ask 18.75c. The best grades of lake last week were sold at 21c and no sales have been reported since, but considerably higher probably now would be asked. Ordinary lake is held at 18.75c and arsenical lake at 18.50c, cash. Casting copper is held at about 18c to 18.25c, delivered 30 days, while higher is asked on special brands.

Marked Increase

In Corporation Earnings for Past Two Months—Deficit for Quarter

Another poor quarterly showing of earnings was made by the Steel Corporation during the first three months of 1915, ended March 31, when after the payment of subsidiary bonded interest, the balance was $12,457,809. This compares with $10,993,170 for the last quarter of 1914, an increase of $1,666,639. This gain probably is not as much as generally had been expected. Only $915,058 was netted from operations and after the payment of the preferred dividend, the deficit of the quarter was $5,389,861.

The earnings by months of the Steel Corporation, since September, 1914, have been as follows:

September, 1914	$5,580,533
November, 1914	2,798,388
December, 1914	2,554,249
January, 1915	1,687,150
February, 1915	3,638,578
March, 1915	7,132,081

It is shown that the January earnings were even less than during the disastrous months of November and December. The January earnings were probably the lowest of any month in the history of the Steel Corporation. A marked increase in earnings is shown for February and March. The regular preferred dividend of 1¾ per cent, was declared largely out of surplus payable May 29 to holders of record May 3.

The statement for the first quarter of 1915, is as follows:

EARNINGS.

	Earn'gs before chrg. int. on the sub. Co.'s bonds outstand'g.	Less: Interest on the sub. Co.'s bonds. outstanding.	Balance of earnings.
Jan. 1915	$ 2,567,176	$ 880,026	$ 1,687,150
Feb.,	4,511,058	872,480	3,638,578
Mar.,	8,004,136	872,055	7,132,081
	$15,082,370	$2,624,561	
Total earnings			$12,457,809
Less, viz.:			
Sink. funds, sub. bds. and deprec., etc. ..		$4,202,251	
Sinking funds U. S. Steel bonds		1,570,985	
			5,773,236
Net income			$6,684,573
Int. U. S. Steel bds.		$5,524,379	
Prem. pay. on bonds		245,136	
			5,769,515
Balance			$ 915,058
Prfd. dividend			$6,304,919
Deficit for quarter			$5,389,861

Charles E. Wetmore, treasurer of the American Hardware Corporation, New Britain, Conn., died at his home in that city on April 26 at the age of 60 years.

Wellman-Seaver-Morgan Co

Awarded Big Crane After Hearing Statements by Americans—Foreigners Were Ignored

Washington, April 27.—The personal hearing accorded by Secretary of the Navy Daniels last Saturday to representatives of three American bidders on the 150-ton floating crane for the Norfolk, Va., navy yard, was followed by the official announcement yesterday that the award had been made to the Wellman-Seaver-Morgan Co., the lowest bidder, at $350,994. This company's previous bid of $323,750 was increased $27,244 because of a change of design desired by the navy department.

The campaign against foreign bidders being given these important contracts, especially at a time when so many American workmen are idle, bore fruit. The hearing was attended only by representatives of American bidders, the Wellman-Seaver-Morgan Co., the Bethlehem Steel Co., and the Morgan Engineering Co., each of which claimed to have submitted the lowest figure for the required design. It was at the request of the Bethlehem Steel Co., according to a statement made to *The Iron Trade Review* by Secretary Daniels, that the hearing was decided upon. It was devoted to explanations by the representatives of the bidders, said Mr. Daniels, of the specifications, and it lasted almost two hours. Present at the hearing also were Admiral Taylor, of the bureau of construction and repair, and Capt. Winterhalter, aid for material. Both these officers, with Admiral Watt, industrial manager at the Norfolk yard, had previously recommended that the award be made to the Wellman-Seaver-Morgan Co. The secretary said he was convinced, after listening fully to the explanations, that the Cleveland company was the lowest, would furnish a crane that would meet all of the severe requirements and was therefore entitled to the contract. The bids of the other American makers were entirely low enough for the designs proposed, he said, and the cranes they would have made, it was explained, would be satisfactory in every respect. It was, said Mr. Daniels, only a matter of giving the award to the lowest bidder whose specifications met the requirements. Mr. Daniels said, even though foreign makers had put in the lowest figures, delivery would be a most serious thing in these days. It was indicated that the secretary would have, under the circumstances, turned down foreign makers.

"The award of the contract," said Mr. Daniels, "was made only after careful investigation and analysis of the various propositions by the authorities at Norfolk and in the navy department." The secretary, in reply to a question, admitted that the department had been placed on its guard more than ever because of the collapse of the German-made crane at Panama canal. It was the earnest desire of the department, he said, to avoid such a spectacle.

Speaking of the Wellman-Seaver-Morgan Co. crane, he said:

"This crane will not only equal in lifting capacity (150 tons) any of the floating cranes already built for the navy, but is of an improved type, owing to the construction which permits the crane to revolve and transfer weights without changing the position of the supporting float, which has been necessary with earlier floating cranes.

"The designs proposed by the three leading bidders were all regarded as excellent, and the award was made primarily upon the basis of price, which, it will be noted, is nearly $100,000 below the original estimate. This saving was due largely to the competition invited and encouraged by the department."

Labor Leaders Indicted

And Twenty Chicago Contractors Are Also Held by Grand Jury—Lighting Association Declared a Trust

Chicago, April 28. (By wire.)—A hundred indictments have been returned by the federal grand jury against labor leaders, contractors and combinations following the probe started last July before Judge Landis. The charges are conspiracy to restrain trade, combinations in restraint of trade interfering with interstate commerce and restraining intrastate commerce. Among the leaders indicted are Simon O'Donnell, president building trade council; Michael J. Boyle, business agent of electricians and three assistants; Mike Artery, machinery movers; John Doheny, boiler makers; Charles W. Fry, machinists, and Peter Shaughnessy, bricklayers. Officers of three electricians unions and 20 contracting firms are indicted for forming a switchboard trust.

The Chicago Lighting Fixture Association is declared a trust and 60 firms are held guilty of participation. A previous indictment named seven business agents, two reindicted now, making 23 labor leaders. The penalty is one to five years' imprisonment and a fine of $100 to $5,000 on each count. O'Donnell was indicted for participation in settling strikes which restrained trade.

In Market for Strip Steel.—R. W. McPhee, 1714 West Street building, New York, is in the market for 23,000 pounds of cold rolled strip steel, as follows: 1,100 pounds 40 x 0.15 millimeters; 11,000 pounds 47 x 0.15 millimeters; 6,600 pounds 56.5 x 0.15 millimeters; 2,200 pounds 74 x 0.18 millimeters; 1,100 pounds 97 x 0.18 millimeters. In addition, prices are desired on cold rolled strip steel 65 x 0.15 millimeters. This material is for export to Spain and the prices are wanted f. o. b. steamer, New York, the transaction to be closed on the basis of cash in exchange for shipping papers.

Death of Nathan A. Taylor

Nathan A. Taylor, a member of the firm of N. & G. Taylor Co., manufacturer of tin plate, died of heart failure at his residence, "Efnemheim," Chestnut Hill, Philadelphia, on April 26, after a brief illness, in his 69th year. He was a senior member of the well known firm of tin plate makers, entering in 1867 the business of which his grandfather was one of the founders. Associated with other members of the Taylor family, the business of the house grew steadily and now comprises one of the largest in the tin plate industry in this country, having large factories at Cumberland, Md., and central offices in the Mariner & Merchant building, Third and Chestnut streets, Philadelphia. In 1891, following the protective tariff legislation, his firm entered into the manufacture of tin plate.

David W. Smack, formerly a member of the firm of McKinley & Smack, owners of the Clinton Iron Works, New York City, died on April 25 at his home in Brooklyn of heart disease, aged 83 years.

Cast Iron Pipe

Better Inquiry at Chicago—Prices Continue to Stiffen in East

Chicago, April 27.—Better inquiry for cast iron pipe is coming out at present and a number of projects of interest are now figured. Bids will be opened April 30 at Cincinnati on the requirements of that city for the present year, estimated at 1,650 tons of various sizes, and at the same time bids will be taken on a 16-inch pipe line involving 1,660 tons of that size and 150 tons of 24-inch. Montrose, Colo., will take bids May 6 on 1,500 tons. The letting at Peoria Heights, Ill., last week, which went to a contractor, involving 1,200 tons, has not been placed, as the business is held up by legal proceedings following the letting. A contractor awarded 450 tons at Lockport, Ill., and is understood to have let the tonnage to the Glamorgan Pipe Co. Bids were opened last Tuesday at Sacramento, Cal., on a tonnage which will total 20,000 tons if cast iron pipe is used. The United States Cast Iron Pipe & Foundry Co. is low bidder and probably will receive the tonnage unless it is decided to substitute steel pipe wholly or in part. Prices remain steady at present quotations and no indication is given of an advance.

Little Public Inquiry

New York, April 27.—Public inquiries for cast iron pipe are not very heavy at the present time, but the amount of private buying still is running practically normal. The market has a reasonably good tone and prices continue to show a stiffening tendency. Some good-sized public lettings are in prospect, including the 10,000 tons of large pipe for Philadelphia, proposals for which yet are awaited. Laurel, Md., is out for 285 tons of 4 to 12's for May 1; Philadelphia for 250 tons, for May 25, which is a contractors' letting; and Lexington, Mass., for 700 tons of 6 to 20's, for May 20. The Bronx Gas & Electric Co. is inquiring for 350 tons of 4 to 6-inch, and the Northgate Water District, Monroe county, N. Y., took bids this week on 600 tons of 6 and 8's. The United States Cast Iron Pipe & Foundry Co. has taken 1,070 tons of 30's for St. Joe, Mo.; 335 tons for Watertown, N. Y., at $22.50, delivered, for the 6 and 8's, and $22 for the 10's and 12's; 115 tons of 6-inch for Elmhurst and Great Neck, L. I., at $22.27, delivered, and 150 tons of 12-inch and castings for Colon, Panama.

Busy in South

Birmingham, Ala., April 26.—Cast iron pipe makers have suffered less in the Birmingham district from the business depression than possibly any other line of business, and their activities at present are almost normal. Much of the stimulus to the pig iron market has come through the buying of pipe makers. Four-inch and larger sizes of water pipe are being quoted from $19 to $20, gas pipe being a dollar higher.

Billets Firm

In the East, Where Recent Sales Were Made at Fair Prices

Philadelphia, April 26.—Further details of some recent billet business of good size placed by buyers in this territory emphasize the ability of makers to command at least $19.50, Pittsburgh, for rolling billets, equivalent to $22.06, Philadelphia. As already noted, one lot of several thousand tons was booked at this figure. Some other propositions of smaller size continue to be put through at $19.50, Pittsburgh. There are some reports of $19 steel, but they do not appear to be cutting much figure. In volume the market remains broader and some further tonnages are about to be closed.

Billets for Export

New York, April 27.—The British Isles continue to be a liberal buyer of semi-finished steel in this country and both the Steel Corporation and the independent companies are placing additional lots of billets and sheet bars there. Sales by the latter usually are being made through merchants and the prices realized have been around $19.50 at middle western mill on sheet bars and at $19.50 to $20, mill, on billets. Among such latter sales made in the week were included lots of 1,500, 1,000 and 500 tons by one company. The Canadian Car & Foundry Co. recently has had out a new inquiry for 5,000 tons of forging steel in connection with ammunition contracts in this country.

No Attractive Orders

Pittsburgh, April 27.—Semi-finished steel products show no change in position. Specifications for billets and sheet bars are described as satisfactory, but no attractive orders have been placed recently. Wire rods are listed at $25, Pittsburgh, and muck bar nominally is named at $27, Pittsburgh. Muck bar has been almost an unknown commodity recently.

The Delphos Metal Stamping Co., Delphos, O., which recently was incorporated with $30,000 capital stock by O. G. Hackedorn, F. X. Altenberger and P. J. Snyder, will manufacture metal fence posts.

Coke Outlook

Is More Hopeful—Several Furnace Companies Are Negotiating

Pittsburgh, April 27.—Connellsville coke oven operators appear more hopeful about the future. Rather heavy sales of pig iron the last 10 days insure continuous activity at several blast furnace plants, and indications are several additional blast furnace stacks will be blown in next month. At least two furnace interests are actively negotiating for a total of 20,000 tons a month for second half delivery. The market for shipment after July 1 has not been definitely established. Reports that the Pittsburgh Steel Co. has closed for requirements after July 1 cannot be confirmed. Sellers of foundry coke are attempting to interest consumers in requirements after the close of the first half, but foundrymen seem to prefer to await developments. The *Connellsville Courier* for the week ending April 17 says production was 298,222 tons, an increase of 8,007 tons compared with the week before.

Eastern Furnaces Figuring

Philadelphia, April 27.—Several eastern Pennsylvania blast furnaces are showing more interest in their last half coke requirements and several new propositions now are receiving the attention of sellers. These call for some round tonnages. Two Lehigh valley furnaces, each of which recently were figuring on 5,000 to 6,000 tons monthly for last half, have taken no action on these matters.

Contract Prices

Cleveland, April 27.—One maker of high grade Connellsville foundry coke is quoting $2.40 for the remainder of the year, but announces that it expects to advance prices on May 15. Another maker is quoting $2.50 for last half. There is very little activity in coke in the Cleveland district.

Furnace Coke Sold

Cincinnati, April 27.—A sale of 35,000 tons of furnace coke has been made in this territory for the last half, and an inquiry for from 8,000 to 10,000 tons of the same grade is pending. This inquiry and transaction constitute the activity in the coke market here, as no furnaces are in need of fuel, and foundries are not buying, but are expected to begin closing their regular yearly contracts in June or early in July. Operators are running only enough ovens to supply contracts. Shipments on old orders are fair. No changes in prices are reported in any southern district.

MEN OF THE IRON TRADE

Who they are Where they are What they are doing

B. T. Bacon of the sales department of Pickands, Brown & Co., Chicago, is spending several weeks at the expositions in California.

J. B. Arnold, of the sales department, of the Illinois Steel Co., Chicago, is spending a few weeks in California visiting the expositions.

J. J. Hargrave, president of the Cincinnati Tool Co., Cincinnati, has returned from a trip to California, where he spent his honeymoon.

Samuel T. Wellman, Cleveland, arrived in San Francisco recently after a trip to Honolulu. He will return to Cleveland May 1.

R. Glaenzer, of Glaenzer & Perraud, Paris, has sailed for France. He had been in this country for several months, making purchases of machine tools.

Willard E. Freeland, of the publicity department of the Norton Co., of Worcester, Mass., has returned from a visit of several weeks to the plant of the Ford Co., in Detroit.

C. E. Doyle, assistant purchasing agent for the Panama canal at Washington, has been made purchasing agent of the Alaska Engineering Co., with headquarters at Seattle, Washington.

George B. Thomas, manager of the Cleveland foundry of the United States Cast Iron Pipe & Foundry Co., has resigned. Mr. Thomas had been manager of the works at Cleveland for many years.

Harold G. Carter, chemist for the Henry Souther Engineering Co., of Hartford, Conn., has accepted a position as metallurgist in the laboratory of the Wyman & Gordon Co., at Worcester, Mass.

Amos P. Mitchell has been elected president of the Rhodes Mfg. Co., Hartford, Conn., to succeed Amasa Trowbridge, who resigned to accept the place of general manager of the Dohler Die Casting Co., Brooklyn, N. Y.

E. Goutard, who has been in this country since last November, making large purchases of machine tools in the interest of the Schneider Gun Works, at Creusot, France, has returned to France.

E. T. Williams, chief of the United States bureau of far eastern affairs, and E. C. Porter, commercial agent for the bureau of domestic and foreign commerce, plan to meet a party of Chinese manufacturers at San Francisco, May 3. Three weeks later the party is scheduled to arrive at Pittsburgh, where mills, blast furnace plants and foundries will be inspected. The visitors will remain in this country about 70 days.

C. H. Domhoff, of the Domhoff & Joyce Co., Cincinnati, pig iron and coke brokers, will leave this week for California, where he will reside in the future. Mr. Domhoff has spent much of his time during the past year in California.

Frank T. Currier, for many years superintendent for John E. Snyder & Son, machinists and machine tool manufacturers, Worcester, Mass., has resigned his position and gone into the business of raising garden truck at his winter home at Oviedo, Fla.

L. F. Hamilton, in charge of the advertising and specialty department of the National Tube Co., Pittsburgh, has returned from an extended business trip to the Pacific coast in connection with the exhibit at the Panama-Pacific exposition.

E. J. Correll, formerly of the sales force of the Newport Rolling Mill Co., Newport, Ky., has been appointed district sales manager of the Canton Electric Cut Co., of Canton O., which manufactures oxy-acetylene welding and cutting machines.

Edward W. Dodge, for 24 years an employe of the Norton Co., Worcester, Mass., and for the past five years sales manager, who recently resigned, has accepted the position of general sales manager of the Waltham Emery Wheel Co., Waltham, Mass.

Charles S. Bygate, formerly Pittsburgh representative of the Whitney-Kemmerer Co., and George W. Theiss now are engaged in the coke business under the name of the Theiss-Bygate Co. The company has offices in the Oliver building, Pittsburgh.

Edward Godfrey, inspecting engineer, R. W. Hunt Co., Pittsburgh, talked about "Problems in the Inspection of Foundry Products", April 19, before members of the Pittsburgh Foundrymen's Association, at the regular meeting at the Fort Pitt hotel, Pittsburgh.

Z. T. K. Woo, president of the Han Yeh Ping Iron & Coal Co., of China, and director of various industrial enterprises in the far east, addressed the American Manufacturers' Export Association at its monthly luncheon at the Biltmore, New York City, April 21.

J. R. Cullen, salesman for the L. S. Starrett Co., manufacturer of machinists' tools, Athol, Mass., has gone to South America on a honeymoon-business trip which will last a year or more. He had just returned from a year in Australia, where he created a considerable increase in the sale of Starrett tools.

C. H. Johnson, of the Gisholt Machine Co., Madison, Wis., sailed recently on the Steamship Christianiafjord. He will spend some time in Russia. Mr. Johnson formerly was the European manager of the Gisholt Machine Co., with headquarters in Berlin. He left Germany shortly after the outbreak of the war and since then had been in this country.

S. Le Fevre, who has been with Witherbee, Sherman & Co., Mineville, N. Y., for the past nine years, announces that his services will be available after May 1 as consulting mining engineer. He has had a wide experience in mining and management, and has had 17 years work in magnetic concentration of ores, and designing of mills, the elaborate plant at Mineville having been largely developed during his time there. His permanent address will be Forest Glen, Ulster county, N. Y.

Selwyn C. Edgar Jr. has been made president of the Edgar Zinc Co., St. Louis, most of the capital stock of which is controlled by the United States Steel Corporation, succeeding his father, Selwyn C. Edgar, who has retired. The new president has been connected with the Edgar Zinc Co. for the past 17 years and has occupied various positions of responsibility. He began his connection as a clerk of the Glendale Zinc Works in 1897 and became superintendent of that works in 1900. In 1905 he was made assistant general manager of the Edgar Zinc Co., at which he was serving at the time of his election to the presidency. Mr. Edgar is a graduate of Hamilton College, class of 1895, and is a member of the Sigma Phi fraternity and of the American Iron and Steel Institute. He is 41 years of age. His residence is in St. Louis. A. S. McMillan has been made vice president of the Edgar Zinc Co.

Reduces Ore Rail Rate

From Mesabi Mines to Upper Lake Ports Five Cents —Shippers Had Hoped for a Deeper Cut

Washington, April 27.—The interstate commerce commission today handed down its opinion in the case of ore carrying rates from Lake Superior iron ore mines to upper lake docks. It held that the existing rate, 60 cents per long ton from the mines on the Mesabi range in Minnesota to vessels at Two Harbors and Duluth, Minn., and Allouez Bay, Wis., is unreasonable, and a rate not exceeding 55 cents is prescribed for the future.

No finding is made with respect to the rates from the mines on the Vermillion and Cuyuna ranges.

The 55-cent rate is to become operative June 15.

The matter of the valuation of the range railroads, particularly the Duluth & Iron Range and the Duluth, Misabe & Northern, both Steel Corporation subsidiaries, seemed to play a large part in the report of the decision. Independent steel shippers, including those of the Mahoning and Shenango valleys of Ohio and Pennsylvania, respectively, the Cambria Steel, Jones & Laughlin, Pittsburgh Steel, and Pittsburgh Steel Ore companies, had hoped to have the rate reduced to 40 cents.

The commission apparently considers the situation with regard to the carrying rates from the Cuyuna and Vermillion ranges abnormal, and quotes representatives of the railroads serving the Cuyuna range who said even if no order be entered with respect to them, the rates fixed for the Mesabi would be controlling. It is assumed the same will apply to the Vermillion rate.

The 60-cent rate was attacked as unreasonably high in and of itself, said the commission, there being no charge of discrimination, except that it was argued that the rate in excess of reasonable would be tantamount to a rebate to the Steel Corporation which controls both the Iron Range and the Misabe railroads. This argument, said the opinion, has not been met by the carriers. The opinion adds:

"It is suggested by the carriers that the commission is not called upon to enforce the anti-trust act, or 'commodities clause' in this case. But the fact that the United States Steel Corporation through its subsidiary, the Oliver Iron Mining Co., is the largest shipper over these roads, cannot be ignored. The fact that this same corporation indirectly controls two of the railroads and owns the larger portion of the ore shipped over them, demands strict interpretation of any standard of reasonableness which is adopted, although the right of these roads to earn a fair return upon the property devoted to public use is not questioned."

Propelling Machinery Awarded

Washington, April 27.—The contract for the propelling machinery for the battleship California was awarded last Saturday by Secretary of the Navy Daniels to the General Electric Co. for $431,000. The Westinghouse Electric Co. was the other bidder. The award carries unusual interest inasmuch as the California will be the first battleship of any nation to have an electric drive. The ship is building at the New York navy yard, which had submitted a bid of $631,000 for building a steam equipment for this dreadnaught. Extreme confidence has been expressed by Secretary Daniels and his technical advisers that the electric machinery will be entirely successful.

Will Build Cars

Chicago, April 28. (By wire.)—The Chicago, Milwaukee & St. Paul road is preparing specifications on 2,000 freight car steel underframes and ten sleepers to be built at its own shops at West Milwaukee. It also will build 500 freight cars with material now on hand.

Order for Pipe

Pittsburgh, April 28. (By wire.)—An order for 17 miles of 8, 10, 12, 16 and 20-inch line pipe, involving 1,500 tons, has been placed by a Pittsburgh gas interest. The demand for merchant pipe is fairly heavy and discounts are described as firm.

Death of Major Bent

Major Luther Stedman Bent, formerly president and chairman of the board of directors of the Pennsylvania Steel Co., a veteran of the civil war and a civil engineer, died at his home near Philadelphia, April 20. He was 86 years old.

Giovanni Secagno, representing Luigi Monge, successors to Roechling Bros., of Genoa, Italy, now is at the Ritz-Carlton hotel, New York City, where he is negotiating with makers on some large blocks of pig iron, particularly Alabama grades, for export to Italy.

Testimonial to Retiring Official

Worcester, Mass., machinery manufacturers had an important part in the public reception and testimonial to retiring Postmaster James W. Hunt, Friday night, April 23, in chamber of commerce hall in that city, when he was presented a grandfather clock and a purse of money amounting to several hundred dollars in honor of his 45 years' service for the government. The presentation was made by the chairman of the general committee of arrangements, Col. Frank Loring Coes, president and treasurer of the Coes Wrench Co., and Loring Coes & Co., Inc. Other men widely known in the machinery world on the committee were: President John W. Higgins and Secretary Donald Tulloch, of Worcester branch, National Metal Trades Association; Prof. George I. Alden, president of the Norton Co. and Norton Grinding Co.; Harry G. Stoddard, vice president of the Wyman & Gordon Co., of Worcester and Cleveland; A. B. Fritts, advertising manager of the Norton Co., and George W. Kilmer, president of the New England Steel Roofing Co.

Another Benzol Plant

Chicago, April 27.—A benzol plant is to be erected shortly at Duluth to recover benzol and tuluol from by-product gas from coke ovens in connection with the Zenith Furnace Co.'s plant.

Contracts have been secured from eastern explosive manufacturers to take the output of this plant for more than a year after completion, not contingent on the European war. The plant will be of sufficient capacity to handle the entire volume of gas from the coke plant.

Sell Blast Furnace.—The Bellefonte blast furnace plant of the Bellefonte Furnace Co., Bellefonte, Pa., is to be scrapped, as a result of its sale by the committee of the bondholders to Henry Potts & Co., Philadelphia scrap iron merchants. This transaction also included the transfer of the Scotia and Red Bank ore mines and equipment. The Bellefonte plant consisted of a stack 70 x 16 feet and was built in 1887. It has been idle and in litigation for several years.

New Malleable Foundry

Plant of Hammond Malleable Iron Co., Near Chicago, is Specially Equipped for Light Work

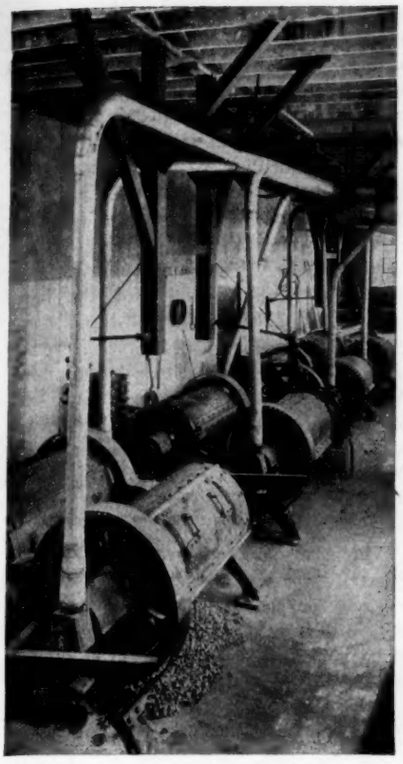


Fig. 1—Group of Hard Iron Mills

THE Hammond Malleable Iron Co., Hammond, Ind., has recently placed in operation a plant designed for economically handling raw materials and finished products, with ample provision for future extensions as conditions may demand. Special care has been exercised to render the plant fireproof and the buildings are constructed entirely of concrete and steel, except the sidewalls, which are brick. The steel columns which are embedded 3 feet in the concrete foundation, support the steel roof trusses, the roof itself being sheathed with copper-bearing rust-resisting corrugated steel sheets. The brick walls fill the space from the foundation to the bottom of the sash, the lower course of glass being ribbed to diffuse the illumination and to promote privacy. Steel sash are used, furnished by the Detroit Steel Products Co., Detroit, Mich. Automatic window openers control the sash in the walls and in the monitors from the floor.

A general plan of the plant is shown in Fig. 3. The works occupies 3½ acres, with a tract of similar area alongside reserved for future growth. The Indiana Harbor Belt Railway borders the plant on the rear with a switch extending into the storage yard and shipping room. This road has a connection with every railroad entering Chicago and raw material and finished castings can be handled direct without entering the congested railroad yards of Chicago. The Gary & Interurban Railway Co.'s tracks pass the door, affording convenient communication with Hammond, Gary and other towns in the South Chicago industrial section. Hammond is 19 miles from Chicago and is part of the manufacturing district comprised in East Chicago, Whiting, Indiana Harbor, Hegewisch and Gary.

The main building, which is 70 x 340 feet, lies with its long axis extending from north to south. The annealing and shipping departments are in a building 80 x 160 feet, leaving a storage yard between 35 feet wide, where pig iron and furnace coal are unloaded.

These buildings are connected along the front by a structure 20 x 185 feet in which are housed the carpenter shop, hard iron mills, pattern shop and superintendent's office. The main office and fireproof pattern storage are in small buildings west of the plant.

This arrangement has in view compactness and at the same time a regular sequence in manufacturing operations from raw to finished product. The result is a horseshoe-shaped plant in which the materials start at one end and are delivered at the other; at the same time this layout makes it possible to receive and dispatch freight over a single railway track.

The plant is unusual in that the stack leading from the air furnace is in the middle of the molding room. The firing doors are situated in a bay at one side and the smoke emitted when the doors are opened with the blast on is conveyed out at once through special ventilators in the side walls. The molding floors are thus kept clear of fumes and smoke. The coal bunkers are but a few feet from the firing door, and the blower is close to the fire box.

The furnace is of 20 tons capacity with a possibility of 24 tons being melted. The bung frames are of special type with hinged ends, making them easy to fill and empty, the end casting being simply raised to release the brick.

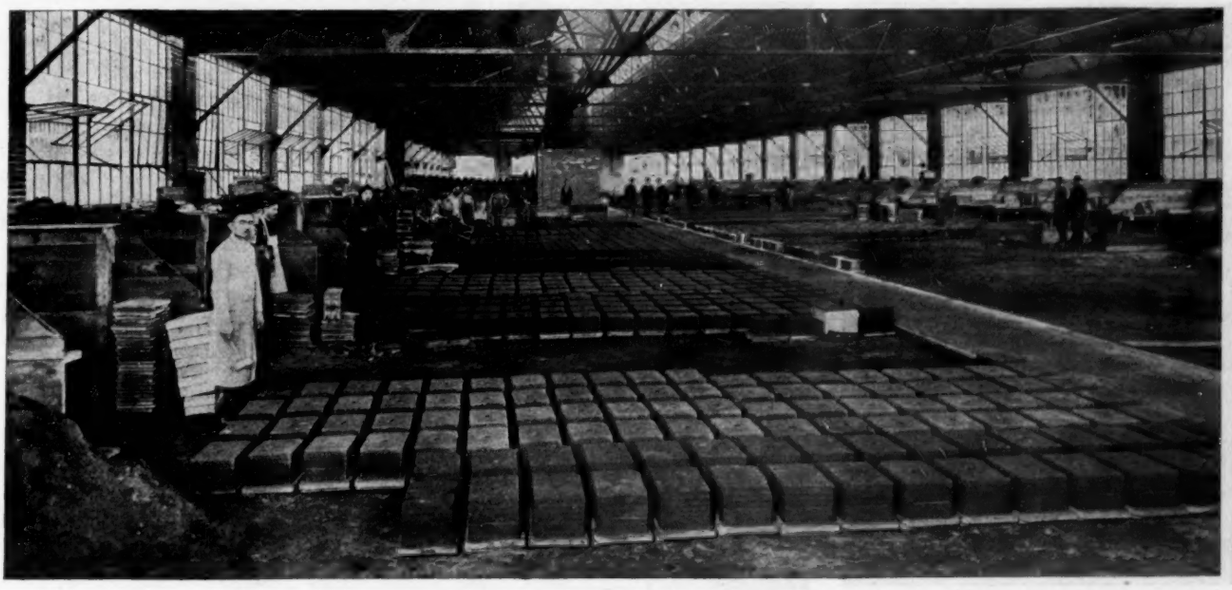


FIG. 2—THE MOLDING ROOM IS CLEAN AND SPACIOUS, SPECIAL VENTILATORS BEING EMPLOYED TO CARRY AWAY SMOKE FROM THE AIR FURNACE

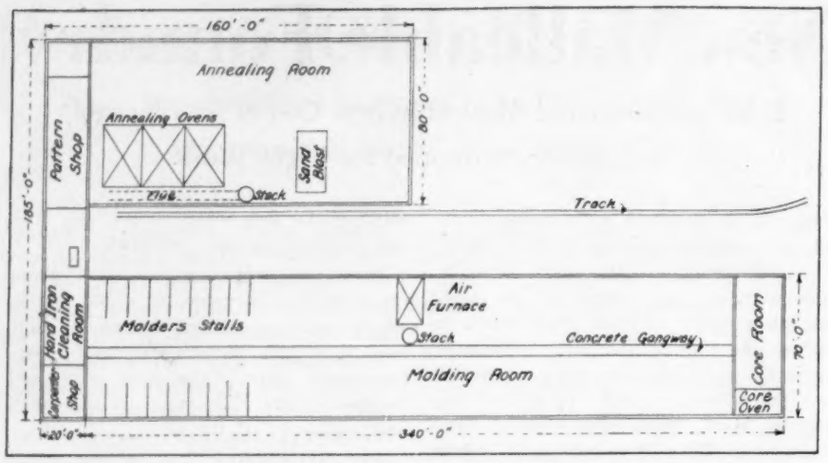


FIG. 3—PLAN OF FOUNDRY OF HAMMOND MALLEABLE IRON CO.

A hoist and monorail is installed over the furnace. The steel stack is self-supporting; it is tied to anchor bolts set in 6 feet of concrete.

Large Area For Molding

Provision is made for 68 molding floors, 10 x 32 feet each, with a central concrete gangway 6 feet wide. Molding machines specially designed by L. E. Keen, superintendent of the plant, are provided on every floor. They are of the swing head type with air squeeze. They will take flasks up to 36 inches square. The machine probably will be put on the market.

The core room which is situated at the north end of the foundry, is equipped with core ovens and a 9-foot Blystone sand mixer.

The hard castings are taken from the foundry to the mill room, Fig. 1, where 10 exhaust tumbling barrels clean them before packing in the annealing saggers.

Three annealing ovens, each of 20 tons capacity, are provided, with space for three others. The flue is carried underground to the stack and an opening is provided on the opposite side of the stack base for a flue from the proposed set of three ovens. The floors of the ovens are built up with 4½ inches of ganister over clay tile followed by a course of paving brick. The approach is across a wide trench in front of the doors, which gives access to the ends of the flues; the latter can be cleaned readily by removing the light plugs of fire clay and brick which close the arches leading through the front walls below the sills.

Annealing Equipment

A concrete floor is laid in the annealing room and as soon as this has settled and gained its final grade a creosoted block floor will be laid on it.

The annealing ovens are equipped with recording pyrometers furnished by the Brown Instrument Co., Philadelphia, provision being made for six instruments. The coal bunkers are located behind the ovens in the annealing room, where they are properly insulated from heat and so arranged that coal may be unloaded directly from the cars.

After annealing, the castings are cleaned in two sand blast machines furnished by the W. W. Sly Mfg. Co., Cleveland; they have a capacity of two tons per hour. The same company supplied the tumbling mills for the hard iron castings. An Ingersoll-Rand compressor, furnishing 300 cubic feet per minute, supplies air for the molding machines, sand blasts, forge, whistle and various other purposes, and a Sturtevant blower provides the blast for the air furnace.

Electrical Equipment

The plant is equipped with General Electric motors, seven being used for various purposes. The compressor is driven by a 50-horsepower motor, and the blower by a 10-horsepower motor. The tumbling mills are direct driven by a 20-horsepower motor, provided with a special outboard bearing. In addition to these, the core room has a 10-horsepower motor, the pattern shop one of 7½ horsepower and the carpenter shop is fitted with one of 5 horsepower.

During the present summer, equipment will be installed to make use of the waste heat from the annealing room ovens and air furnace to provide heat during the winter for the work rooms and office.

The officers of the Hammond Malleable Iron Co. are as follows: President, H. J. Warren; vice president, B. H. Steelman; secretary-treasurer, H. C. Wanner. A specialty is made of automobile and agricultural implement cast-

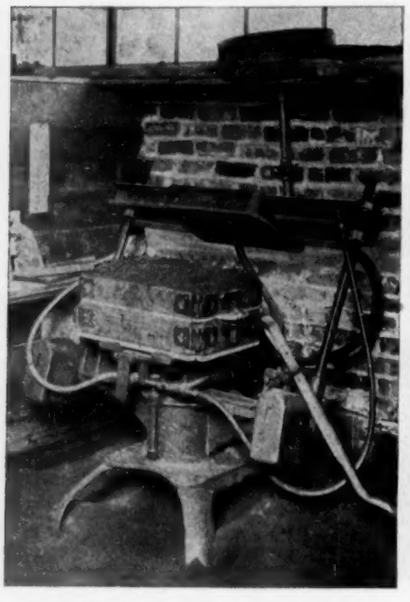


FIG. 4—SWING HEAD SQUEEZE MACHINE

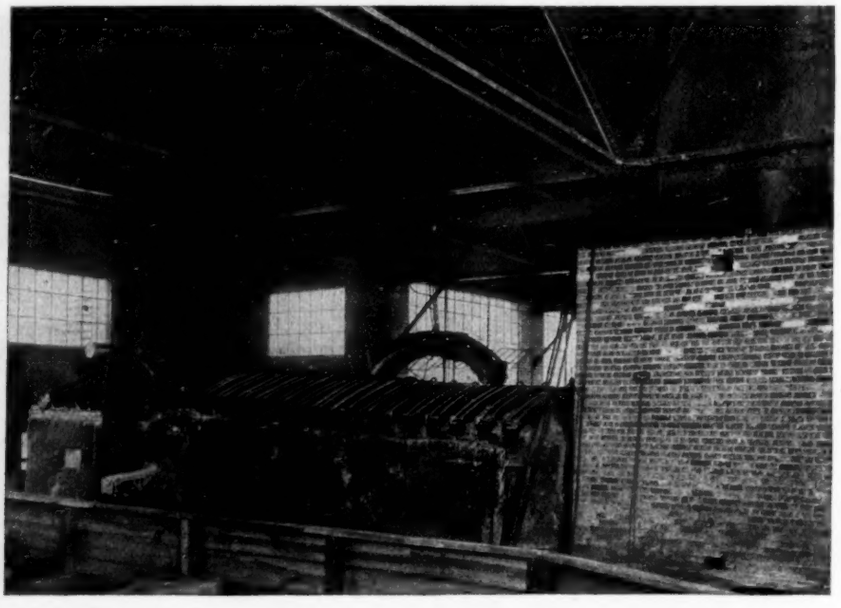


FIG. 5—AIR FURNACE WITH STACK IN CENTER OF MOLDING ROOM

ings and it is said the company began operations with sufficient orders and contracts to run for some time.

New McKee Catalog

Arthur G. McKee & Co., contracting engineers, Cleveland, have issued an exceptionally well arranged and handsomely illustrated catalog showing installations which this firm has handled. The catalog is printed in two colors and covers installations of blast furnaces and smelting plants; thin-lined blast furnaces, blast furnace distributors, storage bins, handling equipment and power plants. Among the blast furnaces illustrated are: Madeline No. 1, Inland Steel Co., Indiana Harbor, Ind.; Cleveland No. 2, Cleveland Furnace Co., Cleveland; Harriet "Y", Wickwire Steel Co., Buffalo; Perry, Perry Iron Co., Erie, Pa.; Ironton, Marting Iron & Steel Co., Ironton, O.; Pulaski, Pulaski Iron Co., Pulaski, Va.; and Anna, Struthers Furnace Co., Struthers, O.

Installations of hot blast stoves, blast and gas mains, with special reference to the Nelson hot blast stove, are shown, and various types of gas washers are illustrated. The conversion of the No. 1 furnace of the Detroit Iron & Steel Co., Detroit, into a thin-lined stack is illustrated and described in detail. A portion of the catalog is devoted to blast furnace stock distributors with a detailed explanation of their operation. The Baker suspension type of storage bin is illustrated and described and installations of this type of bin at the Ironton furnace of the Marting Iron & Steel Co. and the Clinton furnace of the Clinton Iron & Steel Co. are shown. The remainder of the catalog is devoted to descriptions and illustrations showing coal bunker installations, ash handling plants, ore and coal handling equipment, scale and transfer cars, belt conveyors and various power plant installations.

The Cincinnati Iron & Steel Co., Cincinnati advises that its lathe business continues to be very good. Domestic orders have improved. Foreign business also remains heavy. This company recently shipped a carload of lathes to Canada and a few days ago received an order for 140 machines of one size.

The Midland, Pa., blast furnace of the Pittsburgh Crucible Steel Co., which was relined and blown in recently, broke all previous tonnage records in March, when it produced 15,476 tons.

Fails to See Anything Wrong

Referring to the article on the failure of the German-built floating crane at the Panama canal, as described in *The Iron Trade Review*, Feb. 4, a prominent Chicago manufacturer advises that he does not see why the government should be forbidden to purchase machinery abroad. He writes as follows:

"We do not see any reason why the government should not purchase its machinery from other nations under a strict interpretation of the specifications which it has put out, any more than why other nations should not purchase their machinery from us under the same conditions. For instance, as a practical illustration, this company furnished the British government in April of last year, two large specially designed cold metal saws. They were for the admiralty and were taken in competition with both British and German manufacturers; at the present time we are manufacturing another saw of the same design, also for the admiralty.

"In our estimation, for this government to take the position that it would not allow foreign manufacturers to compete for government orders except those of a character which of necessity must be kept a secret of the government, would lead to the prohibition of all foreign trade between nations. The same principle would quickly be taken advantage of by short-sighted manufacturers in every other nation.

"In the last two years the foreign business which this company has done has been no inconsiderable proportion of the total and the profits on the foreign business have been equal to or better than those for machinery supplied to our own government and to our own industries. We remember that in the panic of 1903, our foreign business, especially from South Africa, arrived at a period when it was of tremendous benefit in carrying us through that panic.

"One thing we believe could and should be done when the government lets a contract to a foreign manufacturer. There should be no question about the ability to carry out the specifications, including the time of delivery. This is protection which is justly due to our manufacturers, or to all competitors for that matter."

The Van Dorn & Dutton Co., Cleveland, has issued an illustrated bulletin describing the characteristics and wearing qualities of grade hardened and heat treated gears and pinions which it manufactures. This company is equipped to cut and heat treat gears of all sizes for machine tools, rolling mill motors, automobiles, electric railway motors, etc.

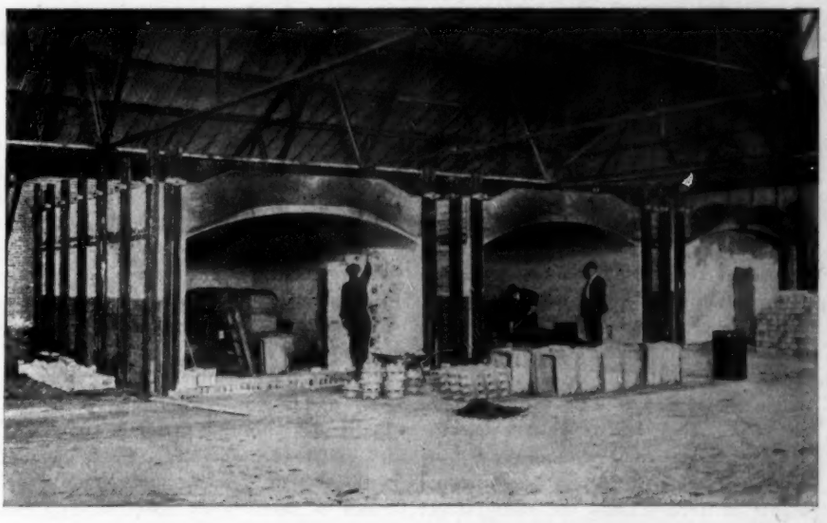


FIG. 6—A CORNER IN THE ANNEALING ROOM

Robert W. Hunt & Co., inspection engineers, Chicago, have issued an interesting pamphlets containing copies of various standard specifications for steel rails. All of the specifications in use in the United States are given in full, together with specifications for rails for export. In addition, tables are presented which give the principal features of various common rail sections. These tables are arranged so that dimensions may be readily compared.

The Chicago Pneumatic Tool Co., Chicago, announces that its New York office has been moved from 50 Church street, to 52 Vanderbilt avenue, and its Boston office from 191 High street to 185 Pleasant street.

Electric Smelting of Ferro-Silicon

Third of Four Articles—Details Regarding Early Experiments—Reduction With Carbon—Description of Plant—Cost of Manufacture

BY R. M. KEENEY

FERRO-SILICON is the most extensively used of all the ferro-alloys produced in the electric furnace. If all ferro-alloys be considered, it is second only to ferro-manganese in amount consumed. Ferro-silicon was first prepared in 1810 by Berzelius, who, with a mixture of iron shavings, silica and carbon, obtained an alloy containing 9 per cent silicon. In 1811, Strohmayer repeated the experiments of Berzelius and prepared a series of alloys containing 2.2 to 9.3 per cent silicon. Valten made ferro-silicon at Terre-Noire in 1872 by the reduction of iron oxide and silica in a crucible with carbon. There was 10 to 12 per cent silicon in the product. Using iron turnings, silica and carbon, he obtained an alloy containing 22 per cent silicon. In 1875 Pourcel made 15 per cent ferro-silicon in the blast furnace at Terre-Noire. Silico-spiegel was made at the same time in the blast furnace of Pourcel. From that time on, the manufacture of ferro-silicon in the blast furnace became firmly established. Moissan in his electric furnace work made some ferro-silicon and silicides. The first company to take up the manufacture of ferro-silicon in the electric furnace was a company in West Virginia operating under the Chalmot patents in 1898. Thus the manufacture of this important alloy in the electric furnace was begun in the United States, but today comparatively little is produced in this country. Blast-furnace ferro-silicon had been manufactured for many years previous to this in the United States. In 1899 the carbide industry in Europe began to collapse, and the manufacture of ferro-alloys was commenced. The first product made was ferro-silicon, the production of which was commenced in 1899 at Bozel, France, under the patents of Rothenau. This was followed by a plant at Meran, Switzerland, in 1900, a plant at Giffre, Switzerland, in 1901, and plants at Matrei, Austria, and at Notre Dome de Briarcon, Ugine, Livet, and Albertville, France, in 1902. There are today many other plants in France, Germany, Switzerland, Austria, Norway and Sweden. In the United States there is but one producer, a company that operates an old aluminum plant at Kanawha Falls, W. Va., and also one at Niagara Falls, N. Y. It is said that not all of the ferro-silicon sold by this company is manufactured in this country, some being imported. At Welland, Ontario, Canada, there is a ferro-silicon works producing about 4,000 tons yearly. The product contains 50 per cent of silicon. Some of it is exported to the United States.

We are indebted to the Bureau of Mines, Department of the Interior, for the use of this material.

The Silicides

A silicide of iron in the proportion 87.28 per cent iron and 11.01 per cent silicon was found in a meteor by Shepard in 1859. Carnot and Goutal isolated the silicide $(FeMn)_3Si$ by treatment of a silicon-spiegel with sulphuric acid. This corresponds in silico-spiegel to the silicide Fe_3Si, 85.714 per cent iron and 14.286 per cent silicon, that possibly exists in ferro-silicon. Naske tried to obtain pure Fe_3Si by treating a ferro-silicon containing 13.19 per cent silicon with ammoniacal copper chloride, but was unsuccessful. By treating a 10 per cent ferro-silicon with sulphur, he obtained a magnetic product which resembled a mixture of FeS and Fe_3Si. Although the silicide Fe_3Si has not been actually isolated, its existence seems probable by analogy with cementite Fe_3C and $(FeMn)_3C$. Fe_3Si is decomposed after a long time by dilute sulphuric acid, and is dissolved by hydrochloric acid from all silicides containing less than 20 per cent silicon. It is not attacked by dilute nitric acid.

The silicide Fe_2Si, 80 per cent iron and 20 per cent silicon, has been isolated from commercial products by Carnot and Goutal, by Osmond and by Lebeau. Carnot treated ferro-silicon with dilute nitric acid and ammoniacal copper chloride and Goutal treated it with warm dilute nitric acid. Hahn obtained Fe_2Si by synthesis, fusing iron chloride, sodium chloride, amorphous silicon, sodium and fluorspar. In the electric furnace Moissan heated iron oxide and crystallized silicon to obtain Fe_2Si. Lebeau obtained it by heating a mixture of iron and cuprosilicon.

Fe_3Si forms small prismatic crystals of metallic appearance. It is magnetic and has a specific weight of seven. It is not attacked by either dilute or concentrated nitric acid. It is dissolved easily by hydrochloric acid, with more difficulty by aqua regia, and completely by hydrofluoric acid. In alkaline solution it is dissolved completely only in hot concentrated solution.

The silicide Fe_3Si_2, which is found frequently in industrial products bearing 25 to 28 per cent silicon, contains 75 per cent iron and 25 per cent silicon. It forms octahedral crystals and has a specific gravity of 6.7. It is as magnetic as Fe_3Si and Fe_2Si. It is stable in the presence of all acids. Chlorine or bromine attacks it when at a red heat. According to Gin, it is decomposed at a high temperature into Fe_2Si and Si.

The best known silicide of iron is FeSi, 66.67 per cent iron and 33.33 per cent silicon. This alloy was prepared by synthesis by Fremy, through the action of silicon chloride upon iron, and by Lebeau through the action of cuprosilicon on iron. Lebeau also isolated FeSi from ferro-silicon containing 35 per cent silicon. FeSi crystallizes in tetrahedral needles. Its specific weight is 6.17, and its hardness about 7. When cold it is attacked by fluorine; at a dull red heat it is attacked by bromine and chlorine, by an alkaline fusion, by hydrofluoric acid, or by a mixture of hydrofluoric and nitric acids.

The silicide $FeSi_2$, 50 per cent each of iron and silicon, has been little studied. It has been prepared by Hahn and Lebeau by synthetic methods. Chalmot treated 39 to 50 per cent ferro-silicon with cold dilute hydrofluoric acid to obtain it. Its specific weight is 5.4 and its hardness 4 to 5. Hydrofluoric acid attacks it only in concentrated solution, and the other acids have no effect upon it.

Ferro-silicon always has a crystalline appearance. If its silicon content is less than 20 per cent it is dull, shows a fine crystallization, and resembles white iron. With a silicon content of 20 to 30 per cent the crystals become more brilliant and show a slaty crystallization. With a silicon content of 50 per cent or more, the crystallization disappears and is replaced by a fine texture resembling more and more silicon. It is not difficult to judge the percentage of silicon by the eye, according to the texture and the color of the fractured surface. As the percentage of silicon increases to more than 50 per cent, the ferro-silicon takes on a bluish color.

The various grades of commercial

ferro-silicon are substantially binary alloys. Two compounds, Fe_2Si and FeSi, exist. The microstructure indicates two eutectics, one containing 21.6 per cent silicon (Fe_2Si and FeSi) and the other containing 60 per cent silicon (FeSi and Si). With a silicon content of less than 20 per cent the alloys consist of solid solutions of Fe and Fe_2Si, which are hard, firm masses giving off little or no gas. Alloys with a silicon content of 20 to 21.6 per cent silicon consist of primary crystals of Fe_2Si in a ground of a eutectic composed of Fe_2Si and FeSi. These alloys are more brittle than the lower grades. With a silicon content of 21.6 to 33.3 per cent, the structure shows FeSi surrounded by the eutectic Fe_2Si and FeSi. With a silicon content of 33.3 to 60 per cent there are crystals of FeSi in the eutectic FeSi and Si. With more than 60 per cent of silicon there exist silicon crystals in a field of the eutectic FeSi and Si.

The chemical purity of the product decreases slightly with decrease in the silicon content. Compared with the impurities of the blast-furnace alloys, the impurities in electric-furnace ferro-silicon are low. The calcium content in the 25 per cent grade is about 0.5 per cent, and increases to 0.7 to 1 per cent for 90 per cent ferro-silicon. The magnesium content varies from 0.10 per cent in the 25 per cent grade to 0.3 per cent in the 90 per cent grade. The average aluminum content in all grades is between 0.1 and 0.15 per cent. In the blast-furnace ferro-silicon the percentage of carbon is 1 to 1.5 per cent. This diminishes with increase in the silicon content, so that in the 25 per cent grade there is about 0.35 per cent carbon, and in the 90 per cent grade the carbon content is as low as 0.2 per cent. The phosphorus content is generally less than 0.10 per cent, the sulphur content less than 0.05 per cent, and the manganese content less than 0.4 per cent.

As has been stated, a ferro-silicon containing between 30 and 65 per cent silicon has a tendency to disintegrate. It is not known whether this property is inherent in these grades, or whether it is due to chemical or physical conditions. The main impurity that might cause disintegration is calcium. If the calcium were present in the state of a silicide, the alloy would be stable, but if the calcium were present as calcium carbide, the alloy would be very unstable. The presence in ferro-silicon of calcium as calcium carbide might be due to the manufacture of ferro-silicon in an old carbide furnace. In a new furnace there should be no contamination by carbide.

It has been noticed that disintegration occurs in spots. In a mass of ferro-silicon of uniform composition, part will stay solid and part break up. Coating the product with paraffin has been tried, but is no longer believed to be efficacious, as it affects only the surface. Some persons believe that disintegration is affected by the temperature of pouring and the density of the current of electricity in the electrodes. When the temperature is high and the amount of current great, the product seems to be more subject to disintegration. It is possible that there is a phenomenon analogous to the allotropic changes of certain elements, such as sulphur. The solid parts have a homogeneous structure and grain, whereas the substance affected by disintegration consists of crystals surrounded by a powder.

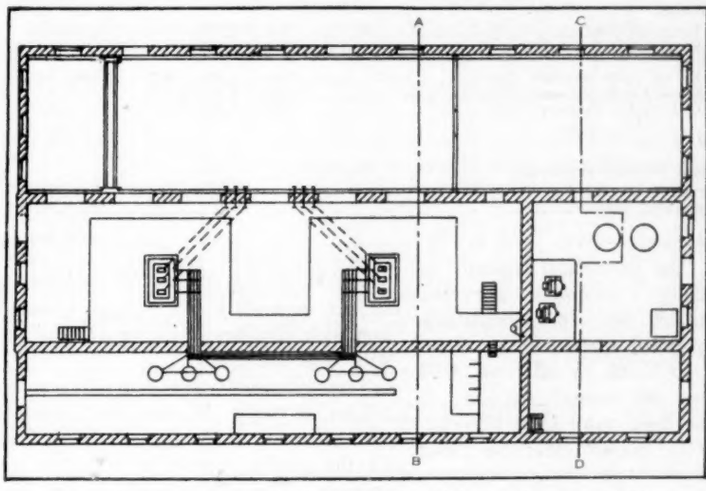


FIG. 1—PLAN OF FERRO-SILICON PLANT

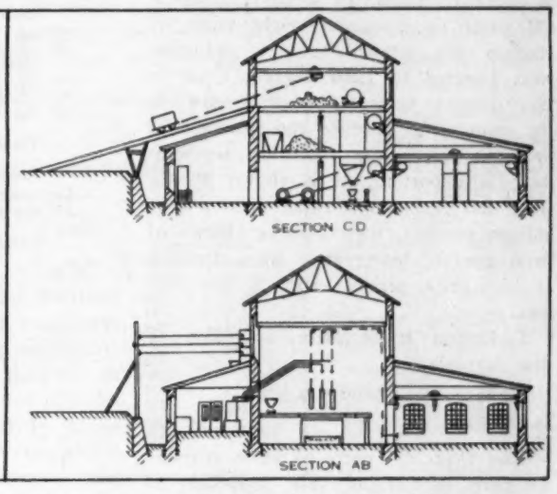


FIG. 2—ELEVATIONS OF FERRO-SILICON PLANT

Formation of Gases

There is evolution of explosive and poisonous gases from these grades of ferro-silicon when the alloy is in moist air and when there is friction between the particles of the alloy as in transportation. Dupre and Lloyd attribute the explosions to acetylene gas made to ignite by the presence of small quantities of phosphide of hydrogen (PH_3), and when this is not present by sparks from attrition of particles of ferro-silicon. Wilson found silicide of hydrogen. Ashenary believed the gas to be hydrogen. Most investigators believe the poisonous gas to be PH_3, as phosphide of calcium and phosphide of iron are not decomposed by water. In his report to the British local government board, Hahe states that he found phosphoretted hydrogen (PH_3) and arseniuretted hydrogen (AsH_3). He did not find in the samples tested any siliciuretted hydrogen (SiH_4) nor acetylene (C_2H_2), although others report those gases present as in ferro-silicon. It is probable that the poisonous emanations are phosphoretted hydrogen and arseniuretted hydrogen evolved by the action of water.

The formation of these gases is due to the presence of small quantities of calcium phosphate $\cdot [Ca_3(PO_4)_2]$ and arsenic in the raw materials. Calcium phosphate occurs in coal and quartz. In itself it is harmless. It is insoluble in water and is common in nature. In the electric furnace, in the presence of carbon, it is reduced to calcium phosphide (Ca_3P_2). The calcium phosphide remains in the ferro-silicon and in contact with water in moist air is decomposed with evolution of phosphoretted hydrogen (PH_3), which is very poisonous. Arsenic occurs in nature closely associated with phosphorus, and finds its way into the ferro-silicon as calcium arsenide, which is decomposed by water or moist air, with the formation of arseniuretted hydrogen (AsH_3), also a poisonous gas.

These gases are evolved only by the grades of ferro-silicon that disintegrate

easily—containing 30 to 65 per cent silicon. The British government board classed as dangerous all grades that contained between 30 and 70 per cent silicon.

Reduction with Carbon

Ferro-silicon is made commercially in two ways only—by the reduction of silica and iron ore with carbon or by the reduction of silica with carbon, the iron being added as iron turnings, which are simply melted. The utilization of siliceous and ferruginous slags has been proposed, but has not been adopted commercially, and experiments of the writer indicate that it does not seem practicable.

Silica is reduced by solid carbon at a temperature of 1,485 degrees Cent. The reduction point of silicon is lowered if there is iron present in the charge to combine with the silica. With a charge composed of 20 parts of silica, 30 parts of iron, and eight parts of carbon the temperature of reduction was lowered to 1,200 degrees Cent. in experiments performed by Greenwood. In commercial practice the presence of iron to lower the reduction temperature is important, as is shown by the fact that furnaces working upon a low-silicon product, with a large charge of iron operate better than when treating a high-silica product with a low iron charge.

Reduction takes place according to the formula:

$$SiO_2 + 2C = Si + 2CO.$$

Thus, the reduction of 100 parts of silicon from 214 parts of silica requires 86 parts of carbon. The reduction of iron oxide is generally by the solid carbon only, according to reaction:

$$Fe_2O_3 + 3C = 2Fe + 3CO.$$

By this formula for the reduction of 100 parts of iron from 143 parts of hematite, 32 parts of carbon are necessary. In the usual ferro-silicon furnace there is no shaft, so that reduction results mainly in the formation of gas, the greater part of which is carbon monoxide, as shown in the above formula.

In the calculation of theoretical power consumption the following constants are used:

Reduction of Oxidation.

	Calories absorbed.
1 kg. Fe from Fe_2O_3	1,746
1 kg. Si from SiO_2	6,428
1 kg. C to CO	2,430

The specific heat of iron for temperatures ranging from 0 degree to 1,400 degrees Cent. is taken as the average 0.20; of silicon for temperatures ranging from 0 degree to 1,400 degrees Cent., 0.25; and of carbon for a similar range, 0.50. Theoretically the energy necessary for the reduction of 1 kg. (2.2 pounds) of silicon from silica is the result of dividing 6,428 by 857, or 7.5 kilowatt-hours per kilogram (3.4 kilowatt-hours per pound). The amount of energy necessary to reduce a long ton of pure silicon would then be 7,600 kilowatt-hours, or 0.87 kilowatt-year, per ton.

In the calculations following, relative to producing ferro-silicon containing 30 per cent silicon from iron ore, the assumptions made are: First, that the iron of the alloy is to be reduced from a pure hematite ore 70 per cent iron; second, that the ferro-silicon is to contain 30 per cent iron and 70 per cent silicon; third, that the silicon is to be from a pure quartz containing 46.7 per cent silicon; and, fourth, that the reduction is to take place according to the given reactions. The calculations follow:

		Calories required.
Reduction.		
700 kg. Fe from Fe_2O_3	700 × 1,746	1,222,200
300 kg. Si from SiO_2	300 × 6,428	1,928,400
Heating.		
700 kg. Fe to 1,400 degrees Cent.	700 × 1,400 × 0.2	196,000
300 kg. Si to 1,400 degrees Cent.	300 × 1,400 × 0.25	105,000
482 kg. C to 1,400 degrees Cent.	482 × 1,400 × 0.5	337,400
Total		3,789,000
Amount of heat supplied:		
By combustion of 482 kg. Cent.	482 × 2,430	1,171,260
By the electric current		2,617,740
Total		3,789,000

Therefore, the theoretical amount of electrical energy necessary for the production of 30 per cent ferro-silicon from iron ore and quartz is the result of dividing 2,617,740 by 857, or 3,054 kilowatt-hours per metric ton, or, in terms of the long ton, 3,109 kilowatt-hours, or 0.35 kilowatt-year per long ton.

In the calculations following relative to producing ferro-silicon containing 30 per cent silicon from iron turnings, the assumptions made in the ore are as follows, the same as for the production of 30 per cent ferro-silicon using iron ore, except that in this case wrought iron or steel turnings are the source of iron:

		Calories required.
Reduction.		
300 kg. Si from SiO_2	300 × 6,428	1,928,400
Heating.		
700 kg. Fe to 1,400 degrees C.	700 × 1,400 × 0.2	196,000
300 kg. Si to 1,400 degrees C.	300 × 1,400 × 0.25	105,000
258 kg. C to 1,400 degrees C.	258 × 1,400 × 0.5	180,600
Total		2,410,000
Amount of heat supplied:		
By combustion of 258 kg. C.	258 × 2,430	626,940
By the electric current		1,783,060
Total		2,410,000

Therefore the theoretical amount of electrical energy necessary for the production of 30 per cent ferro-silicon from iron turnings and quartz is the result of dividing 1,783,060 by 857, or 2,080 kilowatt-hours per metric ton, or 2,116 kilowatt-hours (0.24 kilowatt-year) per long ton.

From these figures it is evident that the production of 30 per cent ferro-silicon in the electric furnace when iron turnings are used requires only 68 per cent of the energy necessary with the use of iron ore.

Analogous to the case of a 30 per cent ferro-silicon, with a 50 per cent product the power consumption with iron ore is 3,945 kilowatt-hours per metric ton, or 4,010 kilowatt-hours (0.46 kilowatt-year) per long ton. If iron turnings are used instead of iron ore the power consumption per ton of 50 per cent ferro-silicon made is 3,245 kilowatt-hours per metric ton, or 3,300 kilowatt-hours (0.38 kilowatt-year) per long ton.

In making 50 per cent ferro-silicon, the saving in energy is not so great by using iron turnings instead of iron ore as in making the 30 per cent product because of the smaller amount of iron necessary in the charge. In making the 50 per cent alloy the energy consumption with turnings is 82 per cent of that with iron ore.

Ferro-silicon of less than 20 per cent silicon is made in the blast furnace, whereas the electric furnace is used for all the grades containing a higher percentage. The grades made in the blast furnace contain 10 to 20 per cent silicon, most of them containing less than 15 per cent silicon. Higher grades can not be produced in the blast furnace because of the impossibility of obtaining a high enough temperature. The wear on the furnace lining is great, and in order to maintain the high temperature necessary, a large quantity of coke is employed. As in the electric furnace, the silicon is reduced by solid carbon. Reduction is said to be more easy if the slag is low in lime and high in alumina—probably because the silicon does not have as strong an affinity for alumina as for lime. The

charge used in the blast furnace may consist of siliceous iron ore, hammer scale, and coke, a hot blast being used. Gin gives as a charge: Turnings 1,000 parts, quartz 410 parts, and coke 940 parts.

In small furnaces the production is 30 to 40 tons per day, and with the large furnaces 80 to 100 tons per day. The blast-furnace operation of making ferro-silicon is similar to making pig iron, except that, owing to the highly siliceous slags, the steady operation of the furnace is more difficult. A small amount of blast-furnace ferro-silicon is imported, but most of it is produced here.

There are two general kinds of charge used in the manufacture of ferro-silicon in the electric furnace. The charge may consist of wrought iron, cast iron or steel turnings, quartz or sand, and charcoal, coal, or coke; or siliceous iron ore, quartz or sand, and charcoal, coal, or coke may be used. The choice of the source of iron depends chiefly on the material available. Iron in the form of turnings of some sort is more commonly used than iron ore, because, as has already been mentioned, it consumes much less power—68 per cent of the amount used for a 30 per cent alloy with iron ore, and 82 per cent for the 50 per cent product. The operation of a ferro-silicon furnace operating on turnings is much steadier and requires less attention because there is not as much slag formed as in the ore process. The purer the raw materials the purer is the product obtained. For this reason wrought iron or steel turnings are preferable to cast-iron borings and are used by most works. At the Girod plant, at Ugine, the average composition of the iron turnings used is 0.4 to 0.5 per cent carbon, 0.15 to 0.25 per cent silicon, 0.5 to 0.7 per cent manganese, 0.6 to 0.9 per cent sulphur, and 0.08 to 0.10 per cent phosphorus. Cast-iron turnings contain as high as 0.5 to 0.8 per cent phosphorus. At works at Bozel, France, steel or wrought-iron turnings containing less than 0.3 per cent phosphorus are used. Another French company, at Livet, uses steel turnings containing less than 0.10 per cent phosphorus. The St. Marcel, France, works of the Societe d'Industrie Electro-Chimiques La Voltes use steel shavings for 30 per cent ferro-silicon, and iron ore 95 per cent Fe_2O_3 for the 50 per cent grade. At Kanawha Falls, W. Va., iron ore is used in the production of 30 per cent ferro-silicon. The ore contains 62.34 per cent iron, 7.93 per cent SiO_2, 0.09 per cent MgO, 0.72 per cent CaO, 0.4 per cent phosphorus, and a trace of sulphur. Gin in some experiments used a highly siliceous iron ore containing 59.2 per cent Fe_2O_3, 2.1 per cent MnO, 24.6 per cent SiO_2 in producing a 50 per cent ferro-silicon.

For the supplying of silicon in the charge, quartzite is preferable to sand because it is more nearly pure, and hence does not cause the formation of as much slag, which clogs the furnace. Also, the fine state of the sand seems to cause less regular operation of the furnace. The quartzite is usually crushed to about 2-inch size. At the Bozel plant mentioned above, the quartzite charged contains 95 per cent SiO_2, 4 per cent Al_2O_3, and traces of calcium and phosphorus. The Girod works use quartzite containing 92 per cent SiO_2 and traces of phosphorus and sulphur. At St. Marcel the quartzite has 98 per cent SiO_2, and a trace of MgO.

Whether charcoal, coke, or coal is used depends largely upon the cost of those materials in the district where a given plant is located. As the materials are used only as reducing agents and as, because of the absence of a shaft, no strength is necessary to support the charge in the ferro-silicon furnaces, the cheapest reducing material available is used. In France the works are all situated in the mountain districts where transportation costs are high, so that the local anthracite coal is largely employed. Most of such coal is rather high in ash, and when grades of ferro-silicon containing 75 per cent or more silicon are being manufactured it is customary to employ charcoal to avoid slag in the furnace. The slag increases the difficulties of operation considerably in the production of high-grade ferro-silicon and also increases the furnace impurities that would pass into the product. At the Girod plant in Ugine, coal guaranteed not to average more than 8 per cent ash or more than 0.005 per cent phosphorus or sulphur is used. The St. Marcel works employ gas coke for the production of 50 per cent grades, and a cheaper anthracite coal for the 25 per cent alloy or other low grades. A French company at Livet uses anthracite coal containing 7 per cent ash, 0.013 per cent phosphorus, 0.41 per cent sulphur, and no arsenic. At Bozel for the lower percentage alloys—50 per cent or less—anthracite coal containing 20 per cent ash is charged, but in the manufacture of the 80 per cent grade, charcoal is employed. In Norway and Sweden, where most of the ferro-silicon works are on tidewater or on a canal, anthracite coal of a high grade is generally used.

In almost all plants the purest raw materials available are obtained for making ferro-silicon. As already mentioned, the introduction of slag-forming materials into the charge is thus prevented, and the presence of objectionable impurities such as phosphorus and sulphur in the product is avoided. With raw materials containing bases the silica intended for the product combines with the bases to form slag with such a high percentage of silica as to be very sticky, so that the pieces can be removed from the furnace only by fishing them out as they work to the surface around the electrode, although some of the slag may be tapped with the ferro-silicon. Owing to the strongly reducing nature of the process most of the phosphorus and sulphur charged goes into the metal. The sulphur, however, is slagged to a small extent.

Ferro-silicon plants are arranged and use the same general types of furnaces as have already been described. The Meraker, Ugine, and Livet works may be considered as typical. Conrad and Pick have made a design of a works using 2,000 kilowatts.

In this plant there are shown two three-phase furnaces, each of 2,000 kilowatts capacity. Only one is operated at a time, the others being held in reserve. Each furnace has its own three transformers connected each to a phase in delta connection. The quartz is hauled up an incline to a crusher

Table I.

POWER CONSUMPTION IN FERRO-SILICON MANUFACTURE

Raw materials.	Silicon in product. Per cent.	Power consumption per pound. Kilowatt-hours.	Power consumption. Kilowatt-hours.	Kilowatt-years.
Quartzite, coke, iron turnings	25	1.82	4,080	0.46
Quartzite, coke, iron turnings	50	3.64	8,160	0.92
Quartzite, coke, iron turnings	75	5.46	12,240	1.38
Slag and coke	25	1.82	4,080	0.46
Slag, charcoal, sand	30	2.18	4,890	0.56
Slag, charcoal, sand	35	2.54	5,600	0.64
Slag, charcoal, sand	50	3.64	8,160	0.92
Quartz, iron ore, coke, or anthracite	25	2.18	4,890	0.56
Quartz, iron ore, coke, or anthracite	50	4.36	9,780	1.12
Enrichment of 25 per cent	50	4.36	9,780	1.12

above, from which it falls into bins below. From the bins it is drawn into a car mixed with turnings and coal and raised on an elevator to the charging floor of the furnace. The general arrangement of the works is similar to that of other works. The total space occupied by the plant is 162,000 square feet, distributed as follows:

	Square feet.
Electric furnaces	12,950
Transformers	6,470
Packing room	4,850
Setting up of electrodes	3,240
Crushing and mixing	6,470
Repair room	2,580
Coal room	12,950
Turnings store	3,240
Quartz store	32,400
Finished product room	6,470
Tool room	3,240
Office, laboratory	4,850
Yard, tracks	64,800
	162,000

The raw materials are all thoroughly mixed before being charged into a ferro-silicon furnace. Charging may be from the tapping floor by a man shoveling the charge into the top of the furnace, or charging may be from a floor at the furnace top, the usual arrangement in modern works. In charging, the material is placed at intervals around the electrodes, so that the top of the furnace never contains molten material except when some works up around the electrode. The electrode projects about 1 foot into the charge, and around the end the material is molten and maintains a space of a fraction of an inch, so that the arc is maintained in the gas formed in the space. The arc is called a freeburning arc. By this method there is a lower power consumption than if the furnace is operated as a resistance furnace entirely. It is essential that the top of the furnace be covered with unmelted material, so as to cause less electrode and raw-material consumption. By operation with a covered bed of fusion, the silicon which is volatilized at a temperature higher than 2,000 degrees Cent. is condensed in the upper part of the furnace. The unmelted charge also causes the coal consumption to be lower. In producing 50 per cent ferro-silicon in a furnace operated with an uncovered bed there were losses of 53.7 per cent of the quartz charged and 43.5 per cent coal by volatilization and oxidation, as compared with 13.01 per cent quartz and 27.58 per cent coal in a modern furnace working with a cold top. As a result of this decrease of losses the efficiency is much increased. In the furnace operating with an uncovered bed and making 50 per cent alloy the power consumption was 7.25 kilowatt-hours per pound, or 16,350 kilowatt-hours per long ton. In operation with a covered bed the energy used was 3.16 kilowatt-hours per pound, or 7,100 kilowatt-hours per long ton. With the furnace having an uncovered bed the efficiency was 25 per cent, and with the furnace having a covered bed the efficiency was 57.28 per cent. The low efficiency of the furnace with an uncovered bed was not due entirely to the sysem of operation, but was also due to the fact that the furnace was of 200 kilowatts capacity, as compared with a capacity of 1,500 kilowatts for the furnace with the covered bed. These examples also show the great strides made in the improvement of furnaces and of operating efficiency in the 10 years from 1900 to 1910, as the small furnace was one of the first to be built and the larger one of modern design.

The furnace is tapped as seldom as possible. The necessity of tapping is indicated by the irregularity of the current as shown by the meters and the irregular blowing of gas out of the furnace, also, when the metal has been too close to the electrode there is an intermittent pounding sound. The shortest interval is about two hours. The length of the intervals depends upon the percentage of silicon in the product and the size of the furnace. In tapping, an iron rod is driven into the tap hole. If material with a high percentage of silicon is being made, it is sometimes necessary to attach the rod to the circuit and burn out the hole with an arc. The tap hole is plugged with fine clay or some similar refractory material.

A furnace operating steadily in making ferro-silicon has white fumes of silicon passing off at the top with carbon monoxide burning to dioxide around the electrodes. In some laboratory experiments by the writer, the condensed fumes from the ferro-silicon furnace contained 67.69 per cent SiO_2, 9.72 per cent Al_2O_3, 4.11 per cent FeO, 0.20 per cent MgO, and 1.90 per cent CaO, the rest probably being carbon.

When it is necessary to shut off the current in changing an electrode, if the shutdown be a long one, bars of iron are stuck down through the charge to make contact with the bottom or between the electrodes, so as to avoid difficulty in starting up. The molten charge is a good conductor, but is not so when solid.

Electrodes are replaced by simply swinging one in over the furnace to replace the holder and the burnt electrode removed. If the electrode has a tendency to rise in the furnace when a fixed voltage is being maintained by hand regulation of the electrode, quartz, a relatively poor conductor, is charged around the electrode, so that it becomes necessary to lower the electrode to maintain the current steadily. If the reverse is the case, coal is added to put in a good conductor for raising it. Because of the use of pure raw materials, comparatively little slag is formed in a ferro-silicon furnace. The slag formed consists of silicates of aluminum and lime or magnesia. They are very high in silica and rather infusible. The addition of more basic materials to make them fusible would be no good, because it would simply draw more silica from the charge and increase the total slag. As the percentage of silicon in the product increases, the specific gravity of the product decreases, so that it is difficult to obtain separation of slag and metal if the slag is sticky. In the manufacture of the 25 per cent alloy, slag is permissible, with a silicon content of 50 per cent, operation is difficult and with higher percentages is impossible if slag is present. As a rule, these slags are so thick that they are not tapped but boil up around the electrode and are removed there. The results of some analyses are as follows:

	Per cent		
SiO_2	68.86	67.60	79.25
Al_2O_3	13.80	19.63	9.04
CaO	26.40	17.00	19.17
Fe_2O_3	1.96	1.02	3.50

The ferro-silicon is tapped into cars

Table II.

COST OF PRODUCTION OF 50 PER CENT FERRO-SILICON PER NET TON

Item.	Norway. Cost of unit.	Norway. Total cost.	France. Cost of unit.	France. Total cost.	United States. Cost of unit.	United States. Total cost.
1,170 pounds of iron	$14.00	$7.30	$14.00	$7.30	$8.00	$4.17
2,750 pounds of quartz	2.00	2.46	2.00	2.46	2.00	2.46
1,470 pounds of coal	8.00	5.30	6.00	3.95	5.00	3.30
50 pounds of electrodes	.04	2.00	.03	1.50	.04	2.00
0.8 kilowatt-year	8.30	6.62	18.66	15.00	26.66	21.30
Labor, salaries	*1	10.00	*.80	8.00	*1.50	15.00
Repairs and maintenance	....	5.00	....	5.00	....	5.00
Amortization and depreciation 5 per cent each	....	2.00	....	2.00	....	2.00
Interest on $50,000 at 6 per cent	....	1.20	....	1.20	....	1.20
General and packing	....	4.00	....	4.00	....	4.00
Total	....	45.88	....	50.41	....	60.43

*Minimum for eight hours.

lined with sand or carbon. It is dumped to cool and broken into small pieces with hammers and weights. In tapping, iron must be kept away from the molten ferro-silicon as in the molten condition it dissolves iron readily. The product is usually packed in 100-kg. (220-pound) iron drums or in kegs.

Results of Early Operations

In the early operations there was much excess raw material charged for the amount of product produced. In a small 200-kilowatt furnace of the old design, the following charges were made: Twenty-five per cent product—40 parts quartz, 40 parts iron, 20 parts anthracite; 50 per cent product—58 parts quartz, 13 parts iron, 29 parts anthracite; 70 per cent product—66 parts quartz, and 34 parts anthracite. The coal contained 20.71 per cent ash (2 to 3 per cent SiO_2), 71.29 per cent carbon, 1.08 per cent hydrogen, 1.11 per cent water, and 0.48 per cent sulphur. The turnings had 98 per cent iron. The quartz was 98.5 per cent SiO_2, and 0.5 per cent Fe_2O_3. For a 50 per cent ferro-silicon the following charge was used in an 1,800-kilowatt modern furnace and may be considered as representative practice: Fifty-four parts of quartz, 20 parts of iron turnings, 30 parts of charcoal. The quartz contained 95 per cent SiO_2 and 3.9 per cent Fe_2O_3; the turnings, 98.5 per cent iron; and the charcoal, 71.9 per cent carbon and 4 per cent ash.

The power consumption with this charge was 7,100 kilowatt-hours per long ton of 50 per cent ferro-silicon. Of the total energy 57.28 per cent was usefully used, 8.61 per cent was used in volatilizing silicon, and 0.23 per cent in volatilizing iron, and 33.88 per cent was lost by induction, radiation, and other losses. The electrode consumption during a month of steady operation averaged 84 pounds per long ton of 50 per cent product. Amorphous-carbon electrodes were used.

When iron turnings are used, the power consumption of a modern furnace of 750 kilowatts or more capacity is 6,800 to 8,000 kilowatt-hours per ton of 50 per cent ferro-silicon, and about 3,500 to 4,000 kilowatt-hours for the 25 to 30 per cent grade. As has already been noted in the discussion of the theory of power consumption, the power consumption is considerably higher if iron ore is used instead of turnings. Using ore, one company has made 28 per cent ferro-silicon with a power consumption of 5,930 kilowatt-hours per ton.

Louis estimates the power consumption in the production of various grades of ferro-silicon, as shown in Table I, the figures being based on a 7,500-kilowatt plant and 750-kilowatt units.

A small furnace of 200 to 300 kilowatts requires one man for charging. Two men for six furnaces can perform the remaining duties, such as tapping and mixing charges, the total number necessary for six furnaces, being eight men. A large furnace of 2,000 to 3,000 kilowatts can be entirely operated by five men.

Electric furnace ferro-silicon is produced in four grades, classified according to silicon content, which is as follows for each grade: Twenty-five to 30 per cent, 45 to 50 per cent, 75 to 80 per cent, and 90 to 95 per cent. The selling of these products is based entirely upon the silicon content, because the carbon content, owing to its usual low percentage, has no effect upon the prices, as in other alloys. Below are given the results of analyses of the four grades of electric-furnace ferro-silicon:

	Silicon content			
Constituent.	25 to 30 per cent.	45 to 50 per cent.	75 to 80 per cent.	90 to 95 per cent.
Iron	68.00	49.00	20.00	9.30
Silicon	30.50	49.50	78.00	88.50
Manganese	0.35	0.30	0.25	0.15
Aluminum	0.10	0.15	0.10	0.15
Magnesium	0.10	0.15	0.30	0.30
Carbon	0.35	0.30	0.30	0.25
Sulphur	0.02	0.015	0.015	0.015
Phosphorus	0.04	0.03	0.03	0.03

In spite of the agitation against the manufacture of ferro-silicon containing between 38 and 65 per cent silicon because of the poisonous gases that are claimed to be given off, this grade is the one most largely made. Moreover, many persons believe that the gases can be eliminated if the ferro-silicon is made from pure materials.

Details on the packing of ferro-silicon in Sweden have recently been obtained by the department of labor. The Gullspangs Elektrokemiska Aktiebalag use iron-bound wooden cases in two sizes, one for the 50 per cent product containing 130 kilograms (287 pounds), and one for the 75 per cent product containing 160 kilograms (353 pounds). The cases are unlined but are made of rabbeted boards. Recently the practice of packing the ferro-silicon in sheet-metal cylinders or drums containing 170 kilograms (375 pounds) was begun. The drums have four holes about ¼-inch diameter in the top to prevent excessive gas pressure.

The Aktiebolaget Heroults Elektriska Stal until recently packed ferro-silicon in old wooden oil barrels. Now the company has adopted sheet-iron barrels with wooden heads. The barrels hold 300 kilograms (660 pounds).

The regulations for transportation differ widely. In Germany water-tight packing is required. As a result, ferro-

(*Continued on page 892b*)

Discuss Standardization

A meeting of the standards committee of the Society of Automobile Engineers was held in Detroit, April 22. Reports from 11 of the subcommittees were received. The standards committee has secured the standardization of a number of automobile parts and the reports submitted at the Detroit meeting treated of certain branches of automobile manufacture, in which no such regularity exists.

The iron and steel division submitted a report on the physical properties of alloy steels and made recommendations relative to specifications for steel castings. This committee also has been considering the vanadium minimum limit in vanadium steels. A report also was submitted discussing the advantages of adopting a standard tooth form for silent chains. Other reports dealt with tap drill sizes and the thread tolerance of machine screws and bolts.

A. S. M. E. Meeting

Arrangements are progressing satisfactorily for the coming spring meeting of the American Society of Mechanical Engineers, which will be held in Buffalo, June 22 to 25. David Bell, engineer, Buffalo Foundry & Machine Co., is chairman of the general committee in charge of arrangements at Buffalo. H. P. Parrock, Lumen Bearing Co., Buffalo, is chairman of the reception committee and David C. Howard, president, Delaney Forge & Iron Co., Buffalo, is chairman of the entertainment committee. During the three days of the meeting, there will be three periods for professional sessions with probably four sessions. Among the interesting papers which will be presented is one on patents by C. W. Parker.

The technical advertising service department, operated by Charles Eckert Young, has been removed from the First National Bank building, Chicago, to suite 1109, Ellsworth building, 537 South Dearborn street. Mr. Young recently has added to his staff Joseph H. Everston as copy writer. Mr. Everston formerly was sales manager of the Arex Co. Edwin Carroll, a well-known commercial artist of Chicago, has been appointed art director of Mr. Young's staff.

The Kennedy-Stroh Corporation, Pittsburgh, has issued a small folder devoted to its products, including castings, gears, valves, unions, crushers, mills, conveying machinery, etc.

New Electric Driven Mill at Warren

Details of Drive at Plant of Western Reserve Steel Co.—Works Built While Business Was Depressed

THE number of sheet mills in the country has increased rapidly during the past few years. Existing sheet mills have added steadily to their capacity and in addition a large number of new companies have been organized to manufacture sheet steel products. In fact, the sheet steel industry probably has shown a greater increase in capacity than any other branch of finished steel manufacture.

As a protection against over-expansion, sheet steel manufacturers have been continually on the alert to open up new markets for their products. The development of the automobile gave the industry a great impetus but the new uses found in recent years are by no means confined to the automobile business. Steel siding, ceiling and formed products of like character, locks and many other products have been developed through the perseverance of sheet manufacturers. One of the latest developments is the proposal to manufacture residences complete from sheet steel.

As an illustration of the faith of sheet manufacturers in the inherent strength of their industry, the Western Reserve Steel Co., Warren, O., may be mentioned. This company was organized, the necessary capital secured and the mill building erected and equipped at a time when the steel industry as a whole was undergoing one of the most severe depressions in its history. C. G. Thomas is president of the new company.

The plant of the Western Reserve Steel Co. is located about one mile south of Warren on a site which provides room for future expansion. The main mill building is of steel construction, with its long axis running from east to west. The building is 624 feet long and 160 feet wide, providing a floor space of approximately 99,840 square feet. The main aisle which houses the mill train and the galvanizing department is 60 feet wide. A 50-foot bay on the south side contains the heating and annealing furnaces and bar storage and a bay of equal width on the north side houses the shearing and finishing equipment. The building is 80 feet high sloping down to a height of 30 feet at the eaves. It has a monitor type roof and is well lighted. As shown in Fig. 2, raw material in the form of sheet bars is delivered directly from cars to the bar storage in the west end of the south bay. The bars are carried by crane on a straight line to the heating furnaces and bar shears. From the furnaces they are delivered directly in front of the hot mills. After being rolled to size, they are delivered by crane to the annealing furnaces, or to the shears in the north bay. Excellent crane facilities permit the rapid handling of sheets to the finishing, galvanizing and shipping departments. The annual capacity of the plant is 40,000 tons. The products include blue annealed and galvanized sheets and formed roofing products.

The rolling equipment comprises six sheet mills, three roughing mills and two stands of cold rolls. Provision has been made for the installation of three additional finishing mills on the west end of the mill train when required. The method of operating the mill train presents some features of unusual interest, electric drive being used. It is believed that only two other sheet

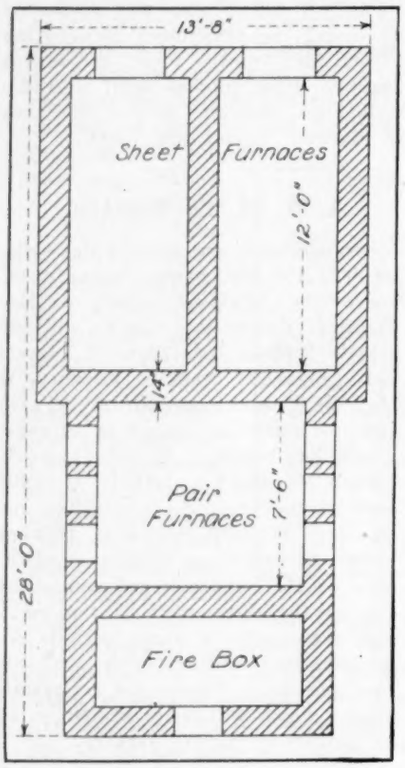


FIG. 1—COMBINATION TYPE HEATING FURNACE

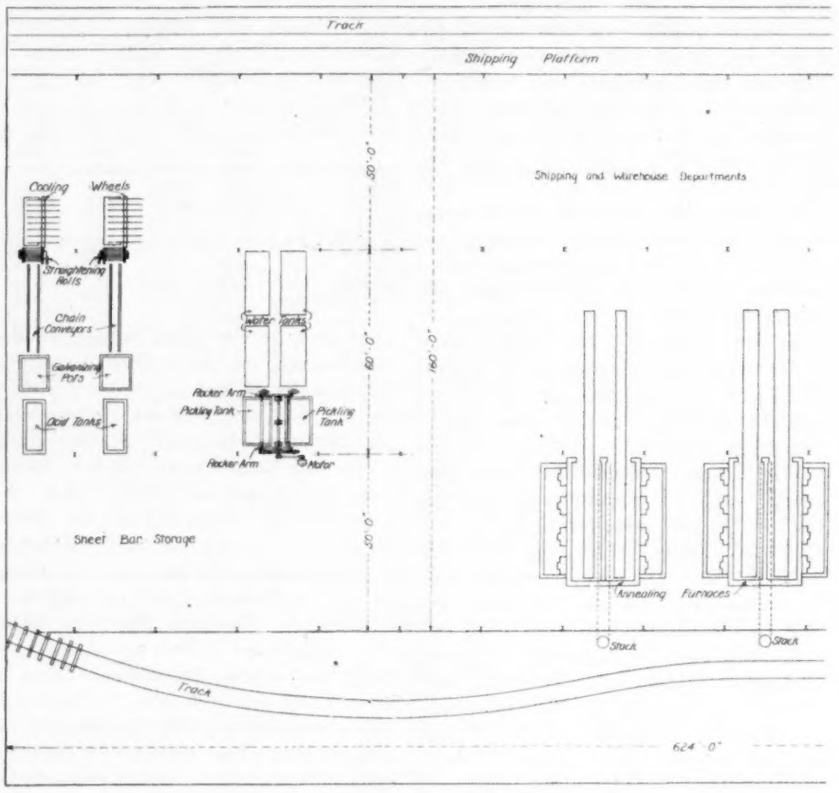


FIG. 2—LAYOUT OF NEW SHEET MILL OF WESTERN

plants in the country are driven by electricity, the Apollo Steel Co., Apollo, Pa., and the Inland Steel Co., Indiana Harbor, Ind.

The main sub-station, as shown in Fig. 2, is located between the heating furnaces and directly in front of the fly wheel. Alternating current for operating the mill is secured from the Trumbull Public Service Co., Warren. It enters the plant at 2,200 volts. The current for operating the cranes and for lighting is stepped down in an auxiliary sub-station adjoining the machine shop.

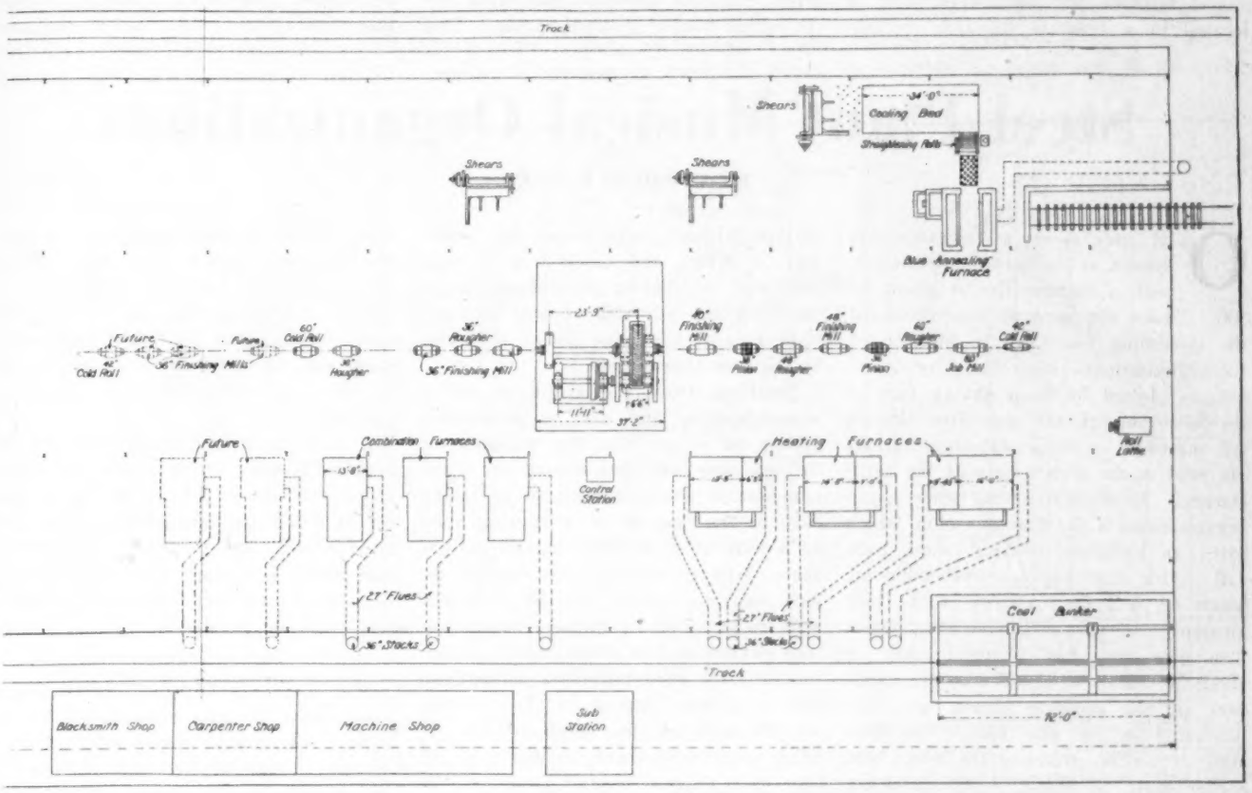
The roll drive consists of a 1,500 horsepower Westinghouse motor, two fly wheels and a set of double helical gears transmitting the power to the mill shaft. The motor is geared to the mill train at a ratio of 9:1. The largest gear is 16 feet in diameter and has a 36-inch face with helical cut teeth. It is driven by a 20-inch pinion. The two cast steel fly wheels are 11 feet in diameter and weigh 17 tons each. They are keyed to a vanadium steel shaft which is directly connected to the motor by a Fiskey flexible coupling. The drive bearings are lubricated by a gravity oil system installed by S. F. Bowser & Co., Inc., Fort Wayne, Ind. All of the gears were furnished by the Wm. Tod Co., Youngstown. The mill was started on Monday, Jan. 4, and was run continuously for six days.

An automatic slip regulator was installed to secure constant speed. This regulator introduces resistance in the rotor when the current reaches a certain value, the speed thereby being reduced and a portion of the energy stored in the fly wheels utilized. When the load is reduced, the resistance is automatically cut out and as the speed increases, energy is again stored in the fly wheel. In service at the Western Reserve plant it has been found that the motor will run for 15 minutes after the power is shut off, or by reversing, the motor can be stopped in 20 seconds.

The rolls on five of the sheet mills are 28 inches in diameter, three having a length of 36 inches, one of 40 inches and one of 48 inches. The roll necks are 22 inches in diameter. The sixth mill is 30 inches in diameter; the rolls have a length of 60 inches, the necks being 24 inches in diameter. The mill housing for each stand weighs 17 tons and the shoe plate has a spread of 6 feet, 6 inches. The rolls on the two cold mills are 26 inches in diameter, the lengths being 42 and 60 inches respectively and the necks 22 inches in diameter.

Paralleling the mills are the six heating furnaces, three of which are of the combination type. The three single furnaces are coal-fired, and are connected by 27-inch underground flues to stacks 36 inches in diameter.

In the combination furnaces, as shown in Fig. 1, the bars are heated by radiation instead of by direct flame. The furnaces are stoker-fired, the stokers being driven by a two horsepower motor. The flame is carried from the fire box over the pair furnaces to the sheet furnaces. The pair furnaces are provided with three doors on each side, affording easy access to any part of the furnace. The pair furnaces are 7 feet 6 inches in width. A 15-inch bridge wall separates the pair and sheet furnaces. Heat for the pair furnaces is secured through openings in a 14-inch flue chamber which carries the flame over these furnaces. The sheet furnaces are 12 feet in length, the two having a width of 13 feet, 8 inches. Each furnace is connected by a 27-inch underground flue to a 36-inch stack. Provision has been made for the installation of two additional combination heating furnaces.



RESERVE STEEL CO., SHOWING ARRANGEMENT OF EQUIPMENT AND ELECTRIC DRIVE

There are two tandem annealing furnaces located directly west of the heating furnaces, in the same bay. These furnaces are of the four box type. Directly west of them is the sheet bar bank, which has a storage capacity of 10,000 tons. This bay is commanded by a 10-ton crane. The coal bunker is at the east end of this bay. Coal is dumped directly from cars by gravity. The coal is handled in 1½-ton buckets which are carried by crane to the furnaces. The pit is 14 feet deep.

The shearing equipment includes two

bar shears and three 156-inch motor-driven shears for cutting and trimming sheets. The latter are located in the north bay close to the blue annealing furnace. A roller leveler and cooling bed directly adjoin this furnace. This bay is commanded by a 10-ton traveling crane.

The pickling, galvanizing and shipping departments are in the west end of the building. Sheets are handled by a 35-ton crane equipped with five-ton auxiliary hoist. The crane commands the main aisle. There are two pickling tanks and two coal-fired galvanizing pots. The galvanizing department is equipped with a conveyor, straightening rolls, and cooling wheels where finished sheets are inspected. The picklers are driven by a 10-horsepower motor.

The machine and blacksmith shop is located in a separate building directly south of the heating furnace. The machine shop is equipped with a drill press, lathe, shaper, threading machine, planer and emery wheel. A roll lathe is housed in the main mill building. Directly adjoining the machine shop is a substation containing the transformers.

The company has excellent shipping and receiving facilities. The Baltimore & Ohio railroad has a switch into the plant and switching arrangements have been secured with the Pennsylvania railroad. There are three switches serving the plant. One to the south is used for incoming material and directly adjoins the bar bank and coal bunker. A depressed track parallels the entire length of the building on the north, bringing the cars at mill floor level. An 8-foot platform parallels this track for the entire length of the building. This switch is used for shipping finished products. A third switch enters the main mill building and is used for handling coal for the blue annealing furnace.

The plant was designed by the H. E. & E. R. Edwards Engineering Co., Niles, O. The sheet mills were installed by the Hyde Park Foundry & Machine Co., Hyde Park, Pa., which company also furnished the shears. The Riter-Conley Mfg. Co., Pittsburgh, had the fabricating contract. A 100-horsepower boiler is used for heating purposes only. The three cranes were furnished by the Shaw Electric Crane Co., New York.

Directly adjoining the works of the Western Reserve Steel Co. on the north is the plant of the Sykes Metal Roofing Co., which was moved to this site from Niles, O. The Sykes company manufactures various formed sheet products.

Steel Plant Musical Organizations

BY CHARLES R. HOOK

OUR men have an organization known as the Armco association, with a membership of about 2,300. Under the general supervision of the governing board are a number of sub-organizations controlled by committees elected by those taking part in the activities of the sub-organizations. All meetings of these sub-organizations are held in the club rooms of the association. Prominent among these sub-organizations is the dramatic club, which gives an excellent minstrel show each fall. This club has a membership of about 40, and their chorus is the best amateur male chorus I have ever heard. The glee club has a membership of about 50. Most of those who are members of the minstrel chorus are also interested in the glee club. The glee club, of course, produces the better and higher class of music. The orchestra has been in existence longer than any of the other musical organizations, and is a credit to the association. A mandolin club has been recently started, and a band is under discussion now.

These musical, as well as all other sub-organizations, such as the baseball league, basketball league, gun club, fencing class, gym classes, etc., are financed by funds appropriated by the directors of the association, and any profits made from minstrels, concerts, etc., are turned over to the permanent home committee, which has charge of a fund which is being built up for the purpose of eventually buying the buildings in which the association is now quartered, or building a new home. From the foregoing you will be able to form some idea of the value placed on music by the men themselves.

Speaking from the standpoint of a superintendent, and also as a worker, permit me to say that the workman or the manager who has missed the thrill experienced when listening to or taking part in the singing of a rousing song by a body of co-workers, has missed the same thrilling sensation felt by the college man, understood even by those not sufficiently fortunate to have had a college experience. "College spirit" is that indescribable something that makes men take a greater interest in their studies for the sake of "the good old school." How many times have we heard a college chap express himself about as follows: "Gee! I'll have to buck up or I'll flunk out, and then back home and the dreary life for me."

What was it that made him want to stay? What takes him back whenever he can "raise the coin" and "get off?" It was, and is, the spirit of good fellowship and satisfaction, encouraged and built up during the leisure hours, very largely by music, both vocal and instrumental. Is there any valid reason why music should have less effect on men in industrial life than on men in college? I think not. Then is there any good reason why music should not make our work more pleasant because of its "get together" influence? I think not.

We have offered a prize for the best song, appropriate for gatherings of our men. I feel confident we will all be happier when we have a little song, all our own, which we can sing or whistle, together or alone, at home or in the shop, on the street or at the club. That something tells us, after all, that we are all brothers, no matter what our positions may be.

I have dwelt particularly on the influence of music on our spirits, but much more, volumes, in fact, could be written on the moral and intellectual influence of good music. We say most emphatically that music is a great boon to the business man, most particularly as it affects his health and happiness.

The author is general superintendent, American Rolling Mill Co., Middletown, O., and this article appeared originally in the *Monthly Bulletin* of the American Iron and Steel Institute.

The following bulletins and technical papers have recently been issued by the bureau of mines, department of the interior: Bulletin No. 81, "The Smelting of Copper Ores in the Electric Furnace," by D. A. Lyon and R. M. Keeney; Bulletin No. 87, "Houses for Mining Towns," by J. H. White; Technical Paper No. 89, "Coal-Tar Products and the Possibility of Increasing Their Manufacture in United States," by H. A. Porter, with a chapter on coal-tar products used in explosives, by C. G. Storm.

The Pittsburgh Emery Wheel Co., Rochester, Pa., has issued a comprehensive standard grinding wheel price list, containing rules for calculating list prices. Numerous tables are presented giving list prices of wheels of various sizes and shapes for a large number of manufacturing purposes.

How to Buy Hoist Controllers

A Few Pointers on the Control of Blast Furnace Skip Hoists, Coal Hoists and Ash Hoists—Cost Not Always a Factor

BY W. T. SNYDER

IT IS the purpose of this paper to describe briefly the controllers on a few different types of blast furnace and steel works hoisting equipment, and to point out some of their advantages and disadvantages, also to point out what, in the writer's opinion, are the points to be desired, as well as the undesirable features to be avoided in selecting controllers for the different classes of service. Fig. 1 shows the general arrangement of the skip, cars, and hoist which it is intended to discuss. The hoist is driven by a 175-horsepower 300-revolutions per minute, 230-volt, compound-wound direct current motor, geared to two drums, each mounted on a common shaft. One of these drums winds up the hoisting cable while the other is unwinding; one car being at the top of the incline when the other is at the bottom.

When the power is shut off the hoist, a solenoid-operated band brake is automatically applied. The solenoid is shunt wound and is energized by the closing of the reverse switches, and released upon their opening. The amount of power and time required through an operating cycle is shown in Fig. 7.

As is shown on this curve, which was taken under normal operation, the time required to hoist the car to the top of the furnace and dump it is 40 seconds. If for any reason faster charging is desired, this time can be reduced to 33 seconds per trip by adjusting the accelerating relay to shorten the time for acceleration, and also, by making a slight adjustment, resistance is automatically inserted in the shunt field circuit immediately following the last point of acceleration, and is cut out again just before reaching the normal slowdown point. When not needed, it only requires a moment to make the necessary adjustments to allow the hoist to operate at normal speed.

Should the hoist cable become slack for any reason, such as a descending car stopping on account of derailment, broken axle, etc., before it reaches the bottom, or if one of the duplicate cables should break, the sagging cable will open an electrical contact which will immediately cut off the power, and the motor comes to rest.

To the hoist drum shaft is geared a contact arm which travels over a dial on which there are contacts that control some of the operations of the main controller after the operator, who is located 40 feet away, throws on the master controller to start.

To the motor shaft is connected a small generator, the voltage of which varies with speed of the hoist up to 70 volts maximum. Across the terminals of this generator is connected a relay which varies the resistance that is connected in multiple with the armature of the hoist motor at the slowdown point. This is accomplished by adjusting the relay so that it will operate, when a load of coke or an empty car is being hoisted, and cut out a section of the resistance that is connected in multiple with the hoist armature.

When a heavier load is being hoisted, the speed of the hoist is reduced, in consequence of which the voltage from the small generator is not high enough to operate the relay, and all the resistance is permitted to be in circuit across the terminals of the hoist armature, thereby producing less retarding effect at this point.

While the permissible overtravel is 28 inches, the actual variation in the stopping point, with this simple slowdown arrangement, does not exceed 5 inches, and is due to the slip of the brakes on the various weights of load. A simplified wiring diagram of the connections of the motor and controller and a chart showing the sequence of operation of controller switches is shown in Fig. 4. This controller is located in the same building as the hoisting machinery. It is inspected and given any necessary attention the same as all other electrical apparatus.

During the past four years, the entire electrical equipment in connection with this skip hoist, including motor, controller, and wiring, has caused a stop

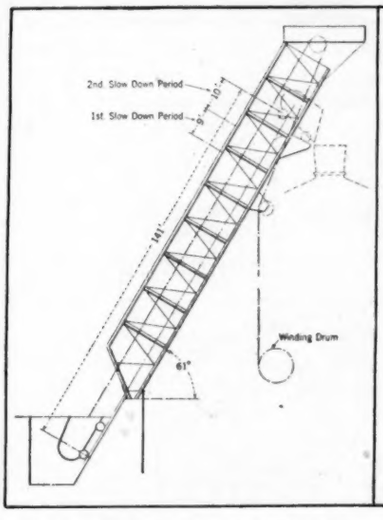


FIG. 1—SKIP HOIST FOR 500-TON BLAST FURNACE

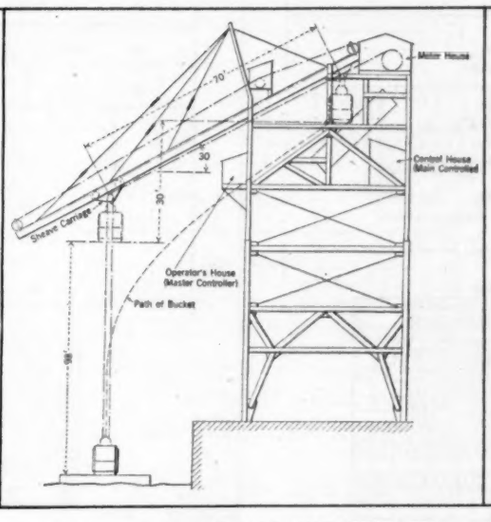


FIG. 2—GENERAL ARRANGEMENT OF COAL HOIST

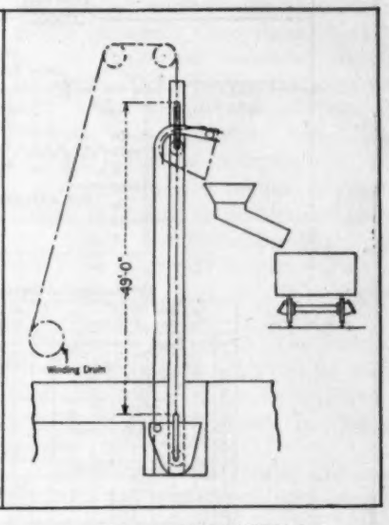


FIG. 3—ASH HOIST

A paper read at the Pittsburgh meeting of the American Institute of Electrical Engineers, April 16, 1915. The author, W. T. Snyder, is electrical superintendent, National Tube Co., McKeesport, Pa.

of 55 minutes on the furnace, and was due to paraffine running out of a relay coil and getting on a secondary contact, thereby insulating the contact and causing the controller to fail to start. Most of the time was spent in hunting the trouble. With proper arrangement of terminals this fault could have been found by test in a very short time.

When it is considered that the skip averages 16 trips per hour, seven days each week, and that the controller goes through the different operations of the cycle each time entirely automatically; accelerates, slows down, and stops, with no further attention after it is started by the operator closing the master switch, the degree of reliability that can be obtained with a modern controller is evident.

The master switch being located remote from the main controller and hoist apparatus makes it inconvenient to maneuver the hoisting machine when changing or adjusting cables. This objection was overcome by providing simple hand control in the hoist house, consisting of several small knife switches connected to the main controller. A single-pole, double-throw knife switch operates the reverse contactors; another single-pole, single-throw knife switch operates the accelerating switches, and another switch of the same type operates the slow-down contactors. This arrangement, in addition to convenience in maneuvering the hoists, permits the electric repairman to try out the main controller after any adjustments or repairs without being required to signal some person to operate the master switch. The scheme has the advantage over a duplicate master switch in that any operation of the main controller can be performed out of its regular order.

To prevent the car from approaching the stopping point at a dangerous speed, a relay is provided in circuit with the hoist armature and retarding resistance, that will operate to cut off power and apply the band brake should the circuit through the motor retarding resistance not be made at the proper time.

When Delay Means Loss

A blast furnace can produce continuously a certain amount of iron which has a certain value dependent upon market conditions. The maximum possible output under best possible conditions would, while these conditions remain unchanged, result in 100 per cent output. Certain conditions arise, however, which require that the rates of melting be reduced and which results in loss of production commonly and erroneously termed delay.

A decrease in the rate of the melting process results not in delay of production but in curtailment of production and should be referred to as a loss in tons of iron or in units of monetary value and not as a delay in units of time. The same reasoning does not necessarily apply in departments using the product from a blast furnace.

In the case of an open hearth department depending entirely upon iron from the local blast furnaces, a shut-down is not necessarily a curtailment of production. As long as there is storage for the blast furnace production during a shut-down of the open hearth department and there is sufficient open hearth capacity to absorb the stored iron along with the normal output from the blast furnace, the stop could be properly termed a delay in production which would be regained later and would not necessarily represent a monetary loss in so far as production is concerned. On the other hand, if there is always an abundant supply of iron and a demand for the open hearth product, a halt in operation in the open hearth department would be a curtailment of production and a monetary loss.

Therefore a failure of auxiliary equipment in any department beyond the blast furnace may result in a delay of production or a curtailment of production, dependent upon conditions. But a failure of auxiliary equipment of a blast furnace that causes a reduction of the melting rate is almost invariably a curtailment of production as well as a monetary loss that cannot be recovered. Thus it follows that in selecting auxiliary equipment for a blast furnace the feature most desired is reliability. In selecting a skip hoist controller the requirements are in the following order: Reliabilty, maintenance, depreciation and initial cost.

The detail parts of the controller should be as few as practicable in order to have a minimum number of possible sources of trouble. There should be enough switches to limit the accelerating current to a value that will not be harmful to the motor or other parts of the equipment. Four accelerating switches, thus giving five steps of acceleration, are ample.

Main contacts should be self-cleaning to prevent excessive arcing and freezing. Auxiliary contacts should be so designed as to prevent accumulation of insulating

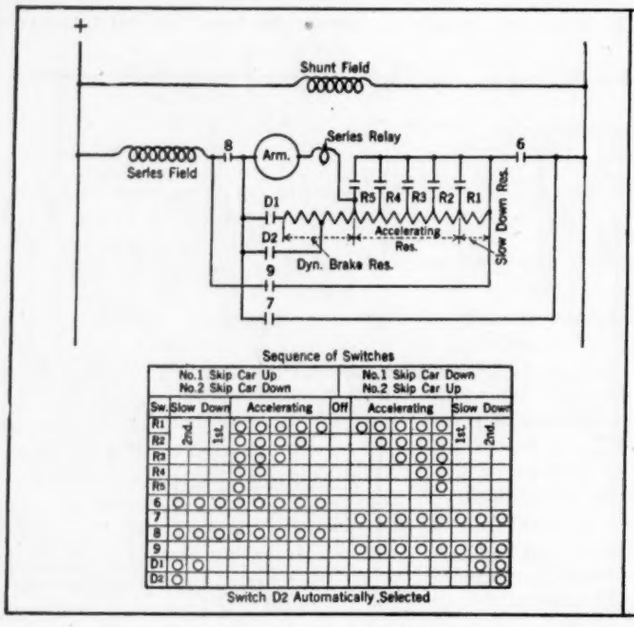


FIG. 4—DIAGRAM OF MAIN CONNECTIONS FOR SKIP HOIST

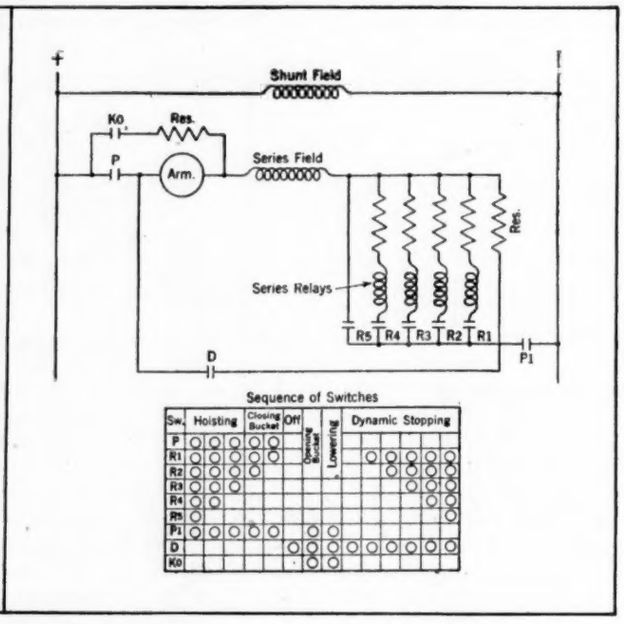


FIG. 5—MAIN CONNECTIONS FOR COAL HOIST

particles that may come from the atmosphere, or elsewhere.

Usually there is heavy electrically-driven machinery operating near blast furnaces that causes the line voltage to fluctuate widely, and shunt-wound switches, designed for 230 volts, particularly for skip hoist controllers, should be designed to operate successfully on any voltage between 175 and 260. The complete controller and its wiring should be so designed that a deposit of coke and ore dust that is common in the atmosphere about a blast furnace cannot cause grounds, short circuits, or sneak circuits.

Skip hoist controllers have in many cases been unnecessarily burdened with elaborate and complicated schemes for obtaining smooth, uniform acceleration, and cut-off point confined within very narrow limits. This is sometimes a very desirable accomplishment for a skip hoist controller to have, but the apparatus necessary for the accomplishment introduces complications and chances for trouble that very materially lessen the reliability of the controller, and the necessity for this close regulation should, whenever practicable, be avoided. A skip hoist controller with which the writer is familiar was originally designed with retarding resistance graduated in about 50 steps, which, by means of regulating apparatus, could be varied to keep the motor speed practically constant from no-load to full load (that is, empty car to load of ore or limestone), through the slow-down period which gave a minimum variation in the stopping point. It was found that a perfectly satisfactory slow-down effect could be obtained with the use of but two steps of retarding resistance. While regulation is not as close as with the original scheme, it answers all requirements and is very much more simple and reliable.

Since operating a skip hoist is only one of numerous duties devolving upon

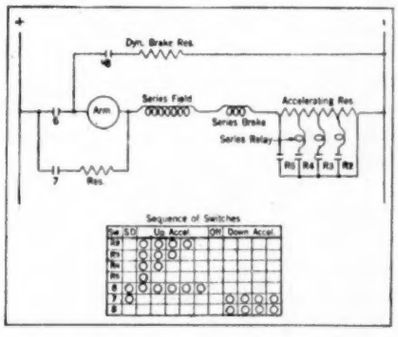


FIG. 6—MAIN CONNECTIONS FOR ASH HOIST

one man it is essential that the controller, after being started, perform all of its functions accurately, accelerating, retarding and stopping automatically. All reasonable protection should be provided, including overload, no-voltage, open shunt field, slack cable cut-out, overspeed, overtravel and provision to cut off power and apply the mechanical brake in case of failure to complete the circuit through the armature and slow-down resistance.

Resistors Should Receive More Attention

The resistor used with a skip hoist controller is seldom given sufficient consideration, and for this reason it is very often a greater source of trouble than the controller, and invariably gives more trouble than it should. As the resistor has equal responsibility with the controller proper, and one is useless without the other, they should be given equal consideration. It is important that the resistor has sufficient carrying capacity to limit the temperaure rise to 50 degrees Cent. High temperatures will in time deteriorate any insulation

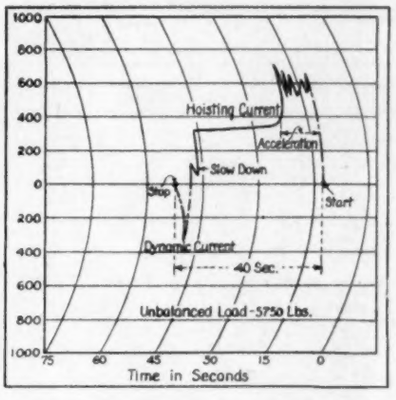


FIG. 7—SKIP HOIST OPERATING CYCLE

now known and the result will be an ultimate breakdown.

Alternate heating and cooling of the resistor result in loose connections, fatigued material, oxidation, broken grids, open circuits, short circuits, grounds, etc. The more frequent the alternations and the wider the temperature range, the sooner will come one or the other of the above mentioned failures. Cast iron is not a desirable material for resistors because of its fragility. Mica is not a desirable insulation for resistors because of its mechanical weakness and rapid deterioration under certain conditions, such as heat, moisture, etc.

Another weakness in banks of cast grid resistors and one that gives more trouble than any other is the multitudinous number of joints, each grid being afflicted with from two or four joints, one on either side of the lugs.

Too much emphasis cannot be placed on the importance of using the best materials and first class workmanship in installing the secondary wiring of the controller itself, and from the controller to the master switch, etc., particularly in connection with a skip hoist controller. For 250-volt work, wire made for 1,500-

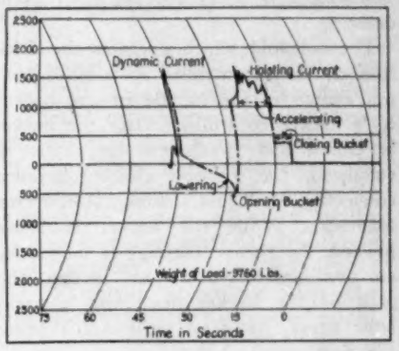


FIG. 8—OPERATING CYCLE OF COAL HOIST

volt working pressure should be used. Secondary wiring should be extra flexible and no wire smaller than No. 12 should be used. Care should be taken not to run wires connected to high resistance relay coils in the same conduit with wires subjected to high induced voltages, which may cause improper action of the relays.

All parts that are subject to renewal should be easily accessible for inspection, repairs and renewals. Spare parts should be as few as possible. This can be done by making all magnetic switches, all secondary contacts, etc., duplicates of each other. The terminals of all main and secondary wiring should be plainly marked and be so arranged to simplify tracing or testing in case of trouble.

A controller that is reliable and easily repaired and maintained will not be subject to depreciation; its life will be determined by obsolescence brought about by changed conditions. Unless there is a change in the design of the blast furnace or skip or some condition arises that renders the controller useless, it will give the same satisfactory service indefinitely.

In selecting a controller for a blast furnace skip hoist, the purchase price should be the last consideration. A controller that would not be dependable seven days in every week should not be accepted as a gift, if one more dependable could be obtained.

An outline diagram of a high-speed hoist, the control equipment of which will be considered, is shown in Fig. 2. This is a double hoist, each being capable of hoisting 100 tons of coal per hour, with a grab bucket of 70 cubic feet capacity, weighing 6,200 pounds empty. The average weight of coal per lift is 1¼ tons, making a total average load of about 9,000 pounds. Each hoist is driven by a 300-horsepower

continuous rating, compound-wound 500-revolutions per minute, 230-volt direct current motor, which is geared to a drum on which is the closing cable. To this drum through a solenoid-operated friction clutch is connected the shell cable drum.

The solenoid which operates the friction clutch is controlled by a push button switch in the handle of the operator's master controller. After the bucket is closed and the stress on cables is equalized, the friction clutch operates, connecting shell and closing cable drums together. While the bucket is being hoisted, the sheave carriage is moved by an auxiliary drive up an incline, the path of the bucket describing a parabolic curve, the total vertical lift being 128 feet.

When the bucket reaches the dumping point the friction clutch is released, a band brake, operated by foot lever, is applied to the shell drum, power is applied to the motor and closing cable drum in the reverse direction, and the coal is dumped into a chute and the bucket continues lowering and moving down the incline at the same time. The hoist motor is retarded by dynamic braking, with the shell and closing cable drums locked together and the bucket in the open position.

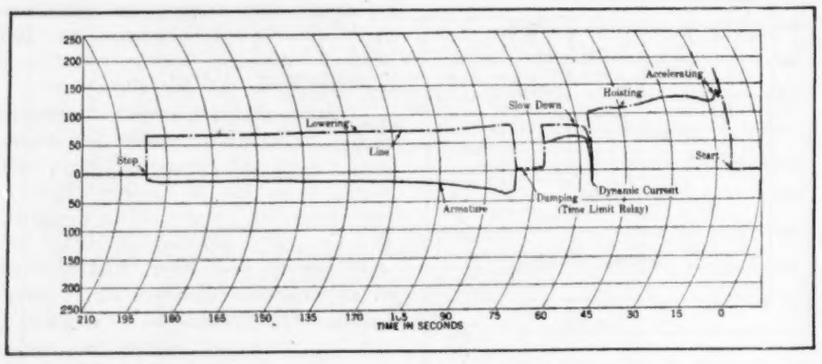


FIG. 9—OPERATING CYCLE OF ASH HOIST

The actual time required to complete a round trip is 37 seconds. The permissible time per trip based on 100 tons of coal hoisted per hour and 1¼ tons per lift is 45 seconds. The power and time required for the complete cycle of operation is shown in Fig 8.

A simplified wiring diagram of the hoist motor and controller is shown in Fig. 5. The magnetic switches on this controller have a continuous rating of 1,000 amperes and have given very satisfactory service for five years.

The master controller, main controller, and motors are located as shown in Fig. 2. The resistor is located in an enclosure separate from the controller house.

On this kind of service it is important to keep all electrical equipment, particularly a magnetic controller, in an enclosure where it can be kept clean. Coal dust being a non-conductor will only be troublesome due to lodging on secondary contacts and insulating them, and by getting into moving parts of magnetic control apparatus; aside from this, it will do no particular damage except that precaution should be taken to prevent coal dust from accumulating in enclosures in which there is electrical apparatus, particularly in controller rooms, for the reason that arcing is liable to cause a conflagration of the dust.

Experiments that have been made by the U. S. bureau of mines have proved that less than 0.2 ounces of coal dust per cubic foot of air will, under favorable conditions, permit propagation of flame from particle to particle of dust and cause a conflagration that will produce a pressure in an enclosure, which will dislodge any dust that may be accumulated on the frame work of the enclosure, etc., and may cause an explosion with disastrous results. This feature should be kept in mind when installing electrical equipment of any kind about a coal hoisting or crushing plant.

Since an equipment of this kind requires an operator having at least the intellectual capacity of a street car motorman, elaborate protective features in connection with the control system are not needed. To devise a controller for an equipment of this kind that would be proof against a careless or incompetent operator would be impracticable if not impossible. The only protection necessary, as has been proved by five years' operation, is current-limit acceleration and overload protection.

As stated, there are two duplicate equipments on a common structure operating as one unit, hoisting coal from the same boat. To provide against heavy current surges on the transmission line and power plant, the hoist controllers were interlocked electrically to prevent both hoisting at the same time, but allowing one to hoist while the other is lowering. In addition to the benefits that were expected, this arrangement has resulted in lower maintenance cost on the hoisting plant, brought about by more even stresses on the structure, and a more even pace on the part of the operators, there being less tendency to reckless operation, since one operator cannot hurry unless the other operator does likewise, and one cannot slow down without affecting the other. The result is that capacity is maintained while stresses on the hoisting equipment and structure, transmission lines and power plant, are much less severe. This arrangement also permits of a more efficient use of the transmission copper.

Since an equipment of this kind must necessarily have some reserve capacity, there is usually sufficient time during the working turn to do all ordinary repair and maintenance work. We therefore attach less importance to continuity of operation for service of this kind, and give the matter of repair and maintenance cost, together with the initial cost, more consideration than if we were selecting a skip hoist controller.

The controller and its wiring, for service such as just described, should be easily accessible, simple in adjustment, and free from delicate refinements, so that the operator can make necessary adjustments and locate and correct all ordinary defects and failures in order that delay and expense of having to send for other more skilled help, be kept to a minimum.

The so-called series switch would not be suitable for this class of service for the reason that selective speed points are desirable both in hoisting and lowering. Referring to Fig. 8, it will be noted that to accelerate, about 1,400 amperes are required for a period of about 7.5 seconds, and only about 1,100 amperes for three seconds are required after the accelerating resistance is all cut out until power is cut off. The accelerating resistance therefore is in circuit about 75 per cent of the total time that the motor is hoisting and it is in circuit about 20 per cent of the total times required for a complete operating cycle.

The accelerating resistance for this work should therefore have a capacity of 1,000 amperes continuously with a temperature rise of 50 degrees Cent. if it is to give satisfactory service. A resistor so designed would prevent excessive heating in normal operation and prevent burn-out in case of accelerating switches failing to close and leaving part of the resistance in circuit. With this rating, the saving in repairs and maintenance over a period of years

(*Continued on page 892c*)

Business News of Nation's Capital

Impossibility of Enforcing Spotting Charges Admitted by Counsel for Trunk Lines and Case Before Commission Collapses

Washington, April 27.—When Geo. Stuart Patterson, appearing as counsel for all the trunk lines in official classification territory, told the interstate commerce commission last Thursday that spotting tariffs on file with the commission could not be justified, shippers' attorneys concluded not to use all the arguments with which they were loaded. It was pointed out by them that Mr. Patterson had admitted the tariffs were illegal and could not be made effective and extended arguments were unnecessary. The commission, it is believed, in view of the apparent collapse of the spotting case, will order cancellation of all tariffs referring to that service, and perhaps suggest that the tariffs be revised or some workable plan be adopted. These and other tariffs were filed by the railroads on recommendation of the commission which had said carriers should abolish so-called free services and substitute charges. The unusual turn the spotting arguments took is held to place the commission in an awkward position.

"Mr. Patterson has ruined my speech," said Richard Jones Jr., Youngstown, O., representing independent steel interests of the Mahoning and Shenango valleys of Ohio and Pennsylvania, respectively, speaking in a simulated tone of injury. Mr. Jones, like other attorneys for shippers, has contended the tariffs were illegal. He took occasion to mildly criticise the commission for ordering trunk lines to resume payment of allowances to steel plant roads. Mr. Jones said the commission was right in its original decision when it held that these allowances constituted rebates, and said that to restore them would renew discrimination against steel plants in the valleys and at other places which do not have rail lines which receive allowances. Spotting charges would increase the alleged discrimination, he said.

Charles S. Belsterling, commerce counsel for the United States Steel Corporation, in protesting against spotting charges, said that even if the railroads had attempted to justify the tariffs, they would have had an "awful time of it, for the iron and steel industry was apparently marked for crucifixion." Following the line of reasoning in the Corporation brief, he said the charges would discriminate against the iron and steel industry more than any other line of business. The eight most remunerative rates for railroads apply to iron and steel articles, he said.

In asking that the tariffs be canceled, he said:

"They are the very epitome of discriminations forbidden by law—discriminations between persons and commodities."

Replying to Mr. Jones, it was stated by Mr. Belsterling that the former evidently had overlooked the fact that

RUSH C. BUTLER

the railroad commission of Pennsylvania had held the Union railroad was a common carrier, and that the same ruling had been made by the Ohio commission with regard to the Newburgh & South Shore and the Lake Terminal. These three lines, owned by Corporation subsidiary companies, are included in the list of five steel plant roads which have been allowed to resume divisions with trunk carriers.

Failure to justify the spotting tariffs, said Mr. Patterson, was due to the fact that they seek to impose a charge upon all spotting done on tracks which at some time have been used for transferring a car from one mill to another in the same industrial plant. Records show, he said, that at one plant a track was used for that purpose once in one year. The test having been made, the rule required that the spotting charge should be imposed on every car set on those tracks, although as a matter of common knowledge the establishment is not equipped with what is ordinarily known as a system of plant tracks used for carrying material from one mill to another.

Mr. Patterson suggested that the commission and the shippers might well devote considerable time to figuring out a just, reasonable and equitable method whereby the vexatious question might be settled. It was declared to be commercially impossible to change the present system. Trunk lines are not prepared, Mr. Patterson said, to make the enormous investments that would be needed to enable them to provide side tracks for all the industries. He said the present system must be continued, and suggested a charge based on the "per car and engine hour" system, or separation of conveyance and terminal charges to differentiate between public team tracks and private delivery tracks, or, thirdly, it might be considered that the existing freight rate includes one handling of a car for the receipt or delivery of freight on a private or public track at a reasonably convenient point within a reasonable time.

An Able Lawyer

Rush Clark Butler, a member of the law firm of Cassody, Butler, Lamb & Foster, with offices in the Monadnock block, Dearborn and Jackson boulevard, Chicago, has been appointed a member of a committee of the chamber of commerce of the United States to co-operate with the new federal trade commission. Mr. Butler is a western man, being born at Northwood, Ia., Aug. 27, 1871. He was educated at the University of Iowa, in Iowa City, and graduated in 1893. He was admitted to the bar in 1894 and has been senior member of his firm since 1910. He is a member of the American Bar Association, the Illinois State Bar Association and the Chicago Bar Association. For some time, he was captain and inspector of rifle practice of the First Infantry, Illinois National Guard. He holds membership in the Union League, Hamilton, University, Law and Midlothian Country clubs.

Business News of Nation's Capital

Federal Trade Commission May Have Hearings as to Methods of Developing Export Trade—Associations Given Clean Bill

His standing in his profession and as a business man is indicated by his choice by the chamber of commerce of the United States to be a member of a committee of this nature. He has made a special study of the federal trade commission law.

Farm Machinery Associations

Washington, April 27.—The majority of practices employed by the principal associations in the farm machinery trade with regard to prices, manufacture, legislation and control of trade were given a clean bill in the report made public yesterday by the old bureau of corporations. Joseph E. Davies, who was chairman of the bureau when it was merged with the federal trade commission, submitted the report to President Wilson before the merger was effected, but pointed out that circumstances prevented immediate publication. He found that, while a large part of the activities of the manufacturers' and dealers' associations in the farm machinery industry are proper for the protection of legitimate interests, yet there are others of doubtful legality which tend to limit the field of competition and to enhance prices.

Comment he makes as to certain practices apparently implies the doubtful legality of the following:

Uniformity of cost accounts as a means of price control; control of retail prices; concentrated control of patents on prices of wind stackers and methods of enforcing dealers' claim to the retail trade. In addition to these practices, the others discussed included efforts of manufacturers' associations to fix wholesale prices; efforts to reduce costs of manufacture and distribution; opposition of dealers to direct sales and sales through irregular dealers and opposition to mail order competition.

Associations involved in the investigation are the National Implement and Vehicle Association, to which every important manufacturer in the farm machinery industry belongs; the National Federation of Implement and Vehicle Dealers' Associations, composed of numerous state and interstate associations, and both national in scope; the National Wagon Manufacturers' Association; plowmakers; the National Association of Thresher Manufacturers, and the National Federation of Retail Merchants. The greater number of these organizations are affiliated with the National Association of Manufacturers.

Referring to alleged agreements in the earlier days between various associations of manufacturers of farm machinery, implements and vehicles, as to uniform prices, the report said it was difficult to maintain such prices. The National Wagon Manufacturers' Association later adopted recommendations that each member should advance prices by the same per cent and prices for certain parts of farm wagons, approved by the association, it is asserted, were also recommended for adoption. Advances in list prices have been apparently used, according to the report, as a means of advancing net prices by plowmakers of standard classifications, standard equipment for various implements and uniform list prices on some of their products, with differentials for specified variations from the standard adopted. Both wagon and plow associations are declared to have attempted to secure greater uniformity in construction in order to facilitate price agreements. The National Association of Thresher Manufacturers is said to have approved net "amounts", or prices below which it was claimed members could not sell except at a loss. Members who were reported to have cut prices were asked in 1909, it is asserted, to reconsider their prices.

Discussed Foreign Commerce

Washington, April 27.—A two-day conference has been held by officials of the department of commerce, William J. Carr, director of the consular service, representative of the state department, and members of a special committee of the department of commerce of the Chamber of Commerce of the United States, which it is believed, will result in Secretary of Commerce Redfield urging the next congress to be more liberal in its appropriation for the development of foreign trade. The idea of increasing the foreign trade, particularly at this time, was given emphasis by the committee, headed by A. W. Shaw, Chicago, publisher of *System*, and the manner of bringing about the desired end was gone over at length. It was asserted that Secretary Redfield was in complete accord with the suggestions made, and will act on them, first by asking congress for more money to build up the foreign trade of the American manufacturer.

The committee also vsited the bureau of foreign and domestic commerce and talked over its workings and plans with Dr. Edward E. Pratt, chief of the bureau. Later the committee visited the bureau of standards, where an opportunity for a thorough examination of the equipment there was afforded by Dr. S. W. Stratton, its director. The conference ended with a discussion by Mr. Carr as to the needs of the consular service. A brief review of accomplishments of the national chamber with respect to legislation was made. Numerous things that it had caused to be done, with the complete co-operation of department heads, were mentioned. They included the appointing of commercial attaches, consular commercial reports, and appropriations for cabling by consuls to expedite commercial information.

Will Meet Business Men

Washington, April 27.—In his address at the annual convention of the California Bankers' Association to be held in San Francisco May 27-29, Dr. Edward Ewing Pratt, chief of the bureau of foreign and domestic commerce, department of commerce, will have much to say with regard to foreign trade and domestic prosperity. On his trip to and from California, Mr. Pratt will tour sections of the south, southwest, west, northwest and middle west.

While in Atlanta, New Orleans, San Francisco, Seattle, and Chicago, Dr. Pratt will make his headquarters at the branch offices of the bureau of foreign and domestic commerce, where he will be pleased to meet manufacturers and merchants interested in foreign trade. It is his desire and his purpose to get into touch with commercial associations in all the cities visited.

Enlarging Bar Mill.—Some enlargement of the steel bar department of the Duquesne works of the Carnegie Steel Co., Duquesne, Pa., has been ordered by the United States Steel Corporation and the appropriations for these improvements have been made.

Money and Iron: Fact and Comment

Not So Much Hysteria on Stock Exchange

Leaders of Past Weeks Not So Prominent and Some Industrials Record Losses —Peace Talk Continues Without Tangible Basis

HYSTERIA was not so prominent a factor in Wall street last week as it had been in several preceding weeks and there were some indications that activities rested on a more solid foundation. Some of the rumors, however, which apparently affected the situation either favorably or unfavorably as to some stocks were as baseless as canards of earlier weeks. For example, there was the story about expectations of a decision favorable to the United States Steel Corporation in the dissolution suit. As a matter of fact, absolutely nothing has been done looking toward a compromise settlement and no one can tell when the decision in the United States district court will be rendered or what it will be. The rumor of a favorable decision was, however, credited with being an element in the advance of 2 points in United States Steel last Saturday. On the other hand, gossip about American Locomotive orders not being closed has been held responsible for a slump in stocks of that company. The truth is that at the time these rumors were circulated there was no justification whatever for regarding American Locomotive stocks with less favor.

The talk of peace has been more prominent during the past week, but has not rested upon anything more tangible than some of the rumors above referred to. The proposition of Dr. Dernburg, ex-colonial secretary of the German empire, in a letter addressed to a pro-German mass meeting at Portland, Me., was merely an expression of personal opinion and his attitude as to Belgium, which he declared "cannot be given up," would prevent the allies from giving his proposition any attention at the present time. In connection with the discussion as to the possibility of peace, there has also been much talk as to what will happen if peace is declared and on this subject opinions differ widely because history furnishes no precedent which can be taken as a guide. Such events as the Russo-Japanese war and the Franco-Prussian war, and even our own civil war and the industrial ups and downs which followed, are far from conclusive as to what may be expected.

Heavy Exports

New York, April 27.—A new high record on exports for the third successive month this year, was established by the port of New York during March, and reached in valuation $126,904,524. The exports for the past three months for this port, have been as follows:

March	$125,904,524
February	109,493,487
January	100,876,132

In March, 1914, the exports were $71,136,061. Imports in March, this year, at New York, were $90,473,321, against $102,200,786 in March, 1914.

One feature of the March exports has been the heavy shipments to European neutral countries. The valuation of the exports last month by country, compared with the corresponding month in 1914, is as follows:

	1915.	1914.
England	$34,058,914	$13,153,438
France	23,579,687	6,547,066
Germany	15,658	7,905,725
Netherands	9,611,319	4,491,203
Italy	8,715,240	2,103,010
Sweden	7,721,850	644,074
Denmark	5,421,460	466,512
Russia	3,106,343	2,646,775
Norway	2,740,084	541,352
South America	9,180,468	6,926,474

The total trade balance in excess of exports over imports of the port of New York since last October is $170,000,000.

Will Sell Stock

Litigation over the sale of stock in the Ewald Iron Co., which operates a well-known rolling mill in Louisville, Ky., has terminated in an order of court to the executor of the estate of L. P. Ewald, the Fidelity & Columbia Trust Co., of Louisville, to sell at public auction at the Board of Trade in Louisville, June 2, 2,955 shares of the capital stock of the company, having a par value of $100, for not less than $214.17. This is the amount at which the executor agreed to dispose of the stock to R. Baylor Hickman, of the Hickman-Williams Co., at a private sale. The guardian of the infant heirs of L. P. Ewald entered a protest, insisting that the stock was worth more. If no other bid is received, the sale at the agreed figure to Mr. Hickman will be approved.

Stockholders of the Tennessee Copper Co., at their annual meeting in Jersey City, Thursday, reduced the number of directors from 14 to 10. Messrs. Briggs, Phillips, Peacock, Fairbanks, Breen and Jansen retired as directors; Richard Sutro and Martin Vogel, assistant treasurer of the United States at New York, were elected to the board. Nutley Wedge was elected president in place of James Phillips and N. H. Emerson was re-elected secretary and treasurer. It was announced at the meeting Thursday that the outlook for the continuation of dividend payments was excellent.

General Electric Co.'s Report

The report of the General Electric Co. for the year ended Dec. 31, 1914, shows earnings equal to 11.12 per cent on the $101,485,700 capital stock, comparing with 13.2 per cent on $101,381,200 stock in the previous year. Gross sales in 1914 were $90,467,691, as compared with $106,477,439 in the preceding year. Profits from manufacturing aggregated $8,970,936, against $10,260,605, while income from other sources brought the total net income up to $11,855,383, in contrast with $14,065,790 in 1913. After paying interest and dividends, the company carried to the surplus account $3,145,059, against $4,908,675 in

the previous 12 months. The income account compares as follows:

	1914.	1913.
Sales billed	$90,467,691	$106,477,438
Exp., dep., etc.	81,496,728	96,207,833
Net	$ 8,970,963	$10,269,605
Other income	2,884,420	3,796,184
Total	$11,855,383	$14,065,789
Int. charges	567,556	1,007,910
Balance	$11,287,827	$13,057,979
Divs. paid	8,142,767	8,149,204
Surplus	$ 3,145,060	$ 4,908,775
Prev. surpus	16,939,819	12,031,144
Total surplus	$20,084,879	$16,939,819

C. A. Coffin, chairman of the board of directors, says in the pamphlet report that while there was a decrease of about 25 per cent in the value of orders received, the total number of transactions was practically equal to that of 1913. As a result of the business contraction the number of employes was reduced until at the close of the year the total on the payroll was 15,000 fewer than a year before.

Expenditures for additions and improvements to manufacturing plants aggregated $6,006,955, of which $4,370,792 was written off from earnings. The net book value of the company's plants on Dec. 31, 1914, was $31,063,331.

The balance sheet shows a strong position, 1914 comparing with 1913 as follows:

ASSETS

	$ 1	$ 1
Patents, etc.		
Cash	22,528,887	14,844,210
Securities	29,667,213	25,964,316
Receivables	19,091,025	26,210,458
Due from sub. c's	5,059,860	6,817,563
Work in progress	843,072	2,012,514
Inventory	29,292,761	37,790,738
Mfg. plant	31,063,331	29,427,168
Real estate, etc.	872,215	1,058,386
Furniture, etc.	1	2
Total	$138,418,370	$144,125,360

LIABILITIES.

Capital stock	$101,485,700	$101,381,200
Deb. bonds	12,067,500	12,151,500
Payables	1,655,226	2,846,656
Notes due	.....	8,000,000
Accrued taxes	464,115	302,133
Adv. payments	434,704	279,561
Accrued int.	196,527	197,016
Div. payable	2,029,718	2,027,472
Surplus	20,084,879	16,939,819
Total	$138,418,370	$144,125,360

Industrial Stocks

In the list of industrial stocks, some that made the largest gains in the preceding week, gained only moderately or lost last week, as, for example, Bethlehem Steel, which in the preceding week made a gain of 29½ points, gained only 7 points last week; American Locomotive, which gained 23¼ points in the preceding week, gained only 2 points last week; United States Steel, which gained 3¾ the preceding week, lost ⅝ of a point last week. The changes in stocks of companies closely connected with the iron and steel business are shown in the following table:

American Brake Shoe & Fdy. Co.	+4⅝
Amer. Brake Shoe & Fdy. Co., prfd.	+5
American Can	— ⅜
American Can, prfd.	— ½
American Car & Foundry Co.	—2
Amer. Car & Fdy. Co., prfd.	— ⅝
American Locomotive	+2
American Locomotive, prfd.	—3¼
American Steel Foundries	—3
Baldwin Locomotive	— ½
Baldwin Locomotive, prfd.	— ½
Bethlehem Steel	+7
Bethlehem Steel, prfd.	+ ¼
Colorado Fuel & Iron	—2¼
Continental Can	—1
Continental Can, prfd.	+ ¾
General Electric	—1⅜
International Harvester of N. J.	+5
Inter. Harv. Corp.	—7
Inter. Harv. Corp., prfd.	.....
Nat'l Enameling & Stamping Co.	—1⅛
Nat'l Enameling & Stamp'g Co., prfd.	+5
Pressed Steel Car	+5⅛
Pressed Steel Car, prfd.	+4
Pullman Palace Car	+2½
Republic Iron & Steel	—2⅜
Republic Iron & Steel, prfd.	—1
U. S. Cast Iron Pipe & Fdy.	—1⅛
U. S. Cast Iron Pipe & Fdy., prfd.	+1
United States Steel	— ⅝
United States Steel, prfd.	+ ½
Westinghouse Mfg.	+ ⅜

High Points of the News

Monday of last week, the New York exchange had aggregate sales of 1,500,000 *shares, compared with only* 380,200 *shares the same day last year.*

Mexican Petroleum advanced 4¼ *Saturday on the strength of an alleged contract by which it will increase sales to the allies. The prominence of a Mexican property in the market at a time when there is such great disorder in our sister republic is one of the remarkable features of the week.*

The favorable showing by the Erie has furnished some encouragement that the turn of the tide in railroad affairs is coming, but the Baltimore & Ohio has reported for March another decrease in gross earnings of $745,000, *with a net increase of* $276,000.

American Tobacco gave a little performance on Wednesday, when it made a gain of 13 *points.*

The receivership of the Chicago, Rock Island & Pacific was not expected at the time of its announcement, but was not an unnatural result of financing methods that have prevailed in connection with that railroad.

Financial Notes

The American Rolling Mill Co., Middletown, O., has declared a quarterly dividend of 2 per cent payable April 15 to holders of record April 6.

The regular quarterly dividend of 1¾ per cent on the outstanding preferred stock of the Taylor-Wharton Iron & Steel Co. for the three months ending March 31, 1915, has been declared payable to holders of record at the closing of the books at 3 p. m. on April 24, 1915. The preferred stock books will remain closed until 9 a. m. on May 1.

The Lackawanna Steel Co. has declared the usual quarterly dividend of 1¾ per cent on its preferred stock, payable June 1 to holders of record May 31.

Sloss-Sheffield Report

The Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., has issued its pamphlet report for the year ended Nov. 30, 1914, showing a surplus after all charges of $21,139, equivalent to 0.21 per cent on the $10,000,000 common stock, as against 2.09 per cent on the same stock the previous year. Preferred dividends amounting to $469,000 were paid during the year. Total surplus as of Nov. 30, 1914, was $3,357,553. The income account compares as follows:

	1914.	1913.
*Profit on pig iron	$327,467	$509,093
Profit on coal	92,781	102,685
Profit on coke	164,391	125,612
Rent, royalties, etc.	243,674	242,388
Int., divs., etc.	15,292	14,298
Total inc.	$843,605	$994,076
Tax, license & gen. exp.	143,466	105,610
Interest	210,000	210,000
Surplus	$490,139	$678,466
Preferred dividend	469,000	469,000
Surplus	‡$21,139	$209,466
Prev. surplus	3,336,414	3,126,948
Total surp.	$3,357,553	$3,336,414

*After charges for depreciation on coal and iron ore, 25 cents per ton on iron for extraordinary repair and renewals and 35 cents per ton profit on coke manufactured.

‡Equal to 0.21 per cent on $10,000,000 common stock, against 2.09 per cent on same stock previous year.

Republic Meeting

At the annual meeting of the Republic Iron & Steel Co., April 21, the retiring directors, E. J. Berwind, Howard M. Hanna Jr., H. L. Rownd and Grant B. Schley were re-elected and subsequently the officers also were re-elected. At the meeting Chairman Topping reported on the various improvements that were being carried out by the company including the construction of additional by-product coke ovens, benzol recovery plant and other miscellaneous enlargements all of which previously had been announced. The directors ratified the appropriations for these improvements.

Discuss Machine Tool Development

Mechanical Engineers Meet in All-Day Session at New Haven and Listen to Interesting Papers

THE development of machine tools with special reference to milling machines, vertical boring and turning machines, sheet metal working presses and grinding machines formed the subject of discussion at an exceedingly interesting meeting of the New Haven section of the American Society of Mechanical Engineers, held on April 21 in Mason laboratory, Yale university, New Haven, Conn. Six papers were presented, three in the afternoon and three in the evening, and that the theme of the meeting was a popular one was proved by the large attendance, which eclipsed all previous records for the New Haven section. In view of the interest shown, the committee in New Haven probably will decide to arrange for further papers on the development of machine tools for the next meeting.

In his paper on "The Early History of Machine Tools", Prof. Jos. W. Roe, of the Sheffield Scientific School, Yale, showed that the development of the machine tool industry to its present state began no farther back than 1775. "In 1775," he said, "the implements available for working metal were practically the same as those of the middle ages—the hammer, chisel and file. There were a few wooden 'whip' lathes and post-drills, too weak and inaccurate for modern work. Hargreaves and Arkwright had just built their first spinning machine, made almost entirely of wood. Watt's steam engine had been invented for 10 years, but not one full-sized engine had been built, because, as Seaton, the foremost engineer of that generation, said, 'Neither the tools nor the workmen existed which could fabricate so complex a machine with sufficient precision.' In 1776, John Wilkinson built a boring mill, which was the first metal working tool of any size and anything like present-day accuracy. On this machine Watt's first steam cylinder was bored, and the modern steam engine made possible. Such was the condition in 1775. Before 1850 most of the general machine tools had taken their present form. After centuries of stagnation, this remarkable development came, most of it, in one generation, from 1,800 to 1840."

More great inventions have sprung from England, Scotland and New England during the past 150 years, said Prof. Roe, than from all other countries combined. In the field of machine tools the proportion is even heavier, probably 80 or 90 per cent. England led the world from 1800 to 1850 and during that period developed most of the general machine tools. About 1850, American toolmakers came into the leadership. The development of the industry in this country began with English mechanics who were among the early settlers of New England. Prof. Roe told about the systematic efforts which Great Britain made to stifle and repress manufacturing in America, not alone stopping the emigration of mechanics and workmen, but preventing the exportation of tools, engines and machinery, together with the models and drawings of such machinery. This policy, he said, far from restricting the manufacturing industries to England, in fact stimulated Americans to manufacture their own machinery. Prof. Roe gave genealogies of prominent individuals and firms identified with the manufacture of machine tools both in England and in this country.

Luther D. Burlingame, industrial superintendent of the Brown & Sharpe Mfg. Co., Providence, submitted a paper entitled "Modern Developments in Milling Machinery". The speaker exhibited what is believed to be the first milling cutter made; this was invented some time prior to 1782 by the French engineer, Vaucanson. Mr. Burlingame also called attention to the first universal milling machine, the property of the Brown & Sharpe Mfg. Co., which was exhibited at the meeting. The speaker described the stages in the development of milling machines.

Saving Money by Grinding

H. W. Dunbar, Norton Grinding Co., Worcester, read a paper on "Grinding as a Manufacturing Process". While admitting that in many cases it is necessary to turn work in a lathe before grinding it, it is a fact, he said, that a great deal of money is lost by manufacturers who do work on lathes that can be done more economically with the grinding machine. He recommended that the possibilities of grinding be thoroughly investigated for each job, and he mentioned some instances of exceedingly satisfactory results obtained with grinding machines in automobile shops. Mr. Dunbar suggested that in order to overcome the prejudice that turning is the only correct method of finishing cylindrical work, it might be advisable for the managers of plants to put their grinding departments in charge of the foremen of the turning departments. By this arrangement, he said, inasmuch as the foreman will be interested in running his department as economically as possible, better results can be obtained than where the two departments are operated separately. Mr. Dunbar told of the difficulty of getting satisfactory results from automatic grinding machines due to the lack of good mechanics to operate them.

A. L. DeLeeuw, Singer Mfg. Co., Elizabethport, N. J., gave a very interesting talk on "Milling Cutters and Cutting Tools". Mr. DeLeeuw said he had found that the angle of a cutting tool is a very important element in the power consumption. Strange to say, most of the power required in operating a lathe is consumed in curling and breaking up the chips, rather than in doing the actual cutting of the metal. It therefore is advisable, he said, to design the tool so that the metal removed will come off as a ribbon and will not chip.

Darragh de Lancey, Waterbury, Conn., read a paper on "Special Forms of Presses for Working Sheet Metal". He classified presses according to the number of operations performed.

E. P. Bullard Jr., of the Bullard Machine Tool Co., Bridgeport, Conn., described the development of the so-called boring mill. This machine, he said, is badly misnamed. Due to the variety of uses to which it is put, it might better be called a turning machine. He described the machine as it originally was constructed and recounted the various improvements in design and the enlargements of its capacity, concluding with a description of the new vertical lathe which the Bullard company recently put on the market.

The afternoon session was presided over by Dr. Lester P. Breckenridge, professor of mechanical engineering at Sheffield Scientific School, Yale University, while J. Arnold Norcross acted as chairman of the evening session. An enjoyable dinner was served to the members and their guests at the Yale Dining Club.

News of Employers and Employes

Loewe Serves Notice That He is About to Collect Fines From Danbury Hatters—Ohio Foundrymen and Union Representatives Will Discuss Safety Rules

D. E. Loewe, head of D. E. Loewe & Co., Danbury, Conn., who after twelve years of litigation, got a final decision in the United States Supreme Court last January, affirming a judgment for over $252,000 damages for boycott against 186 members of the Danbury local of the United Hatters of North America in the famous Danbury Hatters' case, has written a letter to *The Danbury News* warning the defendants that his attorneys were about to take action against the bank accounts and real estate owned by the unionists, which were attached when the suit began. He pointed out, also, that the United Hatters of North America had entered into a written agreement to back up the individual defendants, and that the American Federation of Labor had given them moral support, and urged them to see that these oganizations lived up to these agreements before actual attachment was made of the property of the defendants.

In a statement given out in explanation of the letter Mr. Loewe says:

"At the beginning of the litigation the United Hatters of North America paid each defendant whose bank account was attached the face value thereof and thereby purchased the bank account. Some $30,000 interest has accumulated on the bank deposits, and the union has demanded that interest be paid to it, and is thereby attempting to withdraw this sum and to that extent increasing the liability of the individual defendants. The plaintiffs claim that the interest is but an incident of the principal and is consequently subject to their rights as attaching creditors.

"The value of the real estate to which the plaintiffs may have resort is between $225,000 and $250,000. There would, therefore, seem to be no question as to the payment in full of the entire judgment."

The public notice served by letter in *The Danbury News* points out that three months have gone by since the affirmation of the judgment, and that the plaintiffs have delayed action in order to give the United Hatters of North America, who by written agreement with the record defendants assumed conduct of the suit and responsibility for the payment of the judgment, opportunity to avoid proceedings against individual homes, but that unless that organization at its convention next month makes provison to fulfill its agreement they will allow their attorneys to proceed. "While the Hatters' Union," the letter continues, "may be the only organization legally obligated to you, the American Federation of Labor is morally obligated, and it would seem feasible that your counsel, who is also counsel for the Federation, could make arrangements whereby the Federation through its numerous branches could at least raise voluntary contributions to make full payment.

"The attack on our business was the result of the teachings and practices of the Federation for over a decade and was carried out by the official organizers of the Federation through elaborate machinery and subdivisions organized and operated for such purpose. The Federation filed a petition in the Supreme Court alleging financial interest in the suit and at its convention in 1908 pledged financial support to you. Since the summer of 1910 it has conducted the entire defense, according to its own judgment, at its own expense and with attorneys of its own choosing, but now denies authority to relieve from the judgment it produced.

"Were there no specific authority the Federation could easily raise the money by voluntary contributions of affiliated unions in the same way that they raised over $230,000 to defend the dynamiters in 1912. We want you to realize that it is you alone who can demand support from the union and you alone who can enforce your legal claim against the United Hatters for indemnity. Our obligations to our creditors necessitate action, for we are in the hands of a creditors' committee; and unless arrangements are made at the Hatters' convention for an adjustment we must reluctantly proceed."

Gompers Silent

Washington, April 27.—At the headquarters of the American Federation of Labor it was said that President Samuel Gompers had not indicated whether he would issue a statement with regard to the notice given out by D. E. Loewe of his intention to foreclose the attachments which he holds against 186 members of the United Hatters of America at Danbury, Bethel and Norwalk, Conn. The only thing that will prevent Mr. Loewe from foreclosing, according to dispatches reaching Federation headquarters, is payment by the hatters on or before May 20 of fines assessed against them in the well known boycott case. The fines with interest aggregate $250,000, and to liquidate it, members of the United Hatters' union would have to pay $30 each. The convicted defendants, facing loss of their homes and life savings, are greatly depressed, and feel that the American Federation of Labor should rescue them, inasmuch as their affiliation with the union, rather than individual action against the hat makers, caused the Supreme Court of the United States to uphold the opinion of lower courts fining them treble damages under the Sherman law.

Recently Mr. Gompers said he had no intention of asking the federation to collect by assessment a fund to meet Mr. Loewe's assessment. There is no indication that the men and women concerned in Danbury, Bethel and Norwalk, those who were fined, will appeal for aid either to the hatters' union or the federation, despite the fact that both the union and the federation started the trouble whose penalty was laid upon the 186 hatters. It is naturally felt, however, by the hatters that the federation having got them into trouble, should pay the bill, which would be small if distributed pro rata among the 2,000,000 members of the federation. Mr. Gompers says the federation has no authority to do this, a statement answered by Mr. Loewe, when he says it provided $230,000 for the defense of the Los Angeles dynamiters.

Even though the hatters who are facing such a gloomy prospect never sanctioned the boycott, as they claim, it has been pointed out that they have been brought to an abrupt realization of the penalty of being affiliated with organizations which did actively promote such a vicious undertaking. The court held that, regardless of whether the hatters took an active part or not as individuals, they were responsible for the acts of their officers and organizations.

It has been reported that Mr. Gompers and other high officials have pondered deeply the Danbury situation as it exists and would like to urge the federation to pay the fines, but feel it would "encourage the industrial campaign against the federation." In other words, it is the precedent, rather than the financial element that is feared, according to this view. The federation officers are

News of Employers and Employes

Ohio Foundrymen Will Have Meeting at Cincinnati to Consider Safety Regulations for Ohio Foundries

also said to entertain the feeling that failure to help the hatters will cause a wide open split in the federation, with desertions by the wholesale from its ranks, with prospects of a collapse of the organization.

Will Discuss Safety

The state industrial commission of Ohio has called a meeting of the foundrymen of the state, to be held at the Hotel Gibson, Cincinnati, on Friday, April 30, at 10 a. m. promptly. The purpose of the meeting is to hear the report of the special committee and sub-committees on foundry regulations, which were appointed some time ago by the commission under the chairmanship of Thomas D. West, of the West Steel Castings Co., Cleveland.

Under Mr. West's direction, the committee has been working very hard on the proposed new regulations. The industrial commission of Ohio has at present 21 committees working on regulations for steel plants, foundries, freight elevators, power plants and transmission, rubber, metal and woodworking and all of these committees are now completing their work. When the new regulations are completed for all industries of the state, it is planned to hold a conference with the industrial boards of Pennsylvania and New York, with a view of standardizing regulations for the three states.

All foundrymen are invited to attend the meeting at the Hotel Gibson, which will be in the nature of a public session, so that the members of the foundry committee may have the benefit of all the advice and suggestions possible.

Under the old plan, factory regulations were made in the legislature, but under the authority invested in the industrial commission, this body has the power to appoint committees of employers and workmen, who make their own factory and workshop regulations; in other words, the employers and the workmen are the legislators, making their own laws.

The meeting at the Gibson Hotel will be in charge of Victor T. Noonan, safety director of the industrial commission of Ohio, who will bring statistics before the attention of the foundrymen, showing the number of fatal and non-fatal accidents in foundries throughout the state, and the cost in compensation. Mr. Noonan contends that there are 50 per cent too many accidents in Ohio, and in his safety campaign at present he is urging employers and workmen alike to help reduce the 80,000 accidents that occurred in Ohio last year by at least 50 per cent.

The following are the members of the foundry committee:

John O'Neil, 446 W. First avenue, Columbus; Fred L. Baumgartner, 505 Superior building, Cleveland; J. F. Sords, general superintendent, representing D. J. Ryan, president Allyne-Ryan Foundry Co., Cleveland; Timothy Rowan, Molders' Union, Hamilton; Thomas D. West, West Steel Castings Co., Cleveland; J. D. Leary, Leary & Manley Foundry Co., Cincinnati; J. A. Oberhelman, care Oberhelman Foundry Co., Cincinnati; H. J. Boggis, Taylor & Boggis Foundry Co., Cleveland; Henry Titer, 1327 Lagonda avenue, Springfield; J. E. Galvin, vice president Ohio Steel Castings Co., Lima; Thomas McDonald, Platt Iron Works, Dayton; Peter Curley, Industrial Commission, Cleveland; G. H. Thompson, Columbus Malleable Iron Works, Columbus.

Many Trades Are Involved

In Chicago Strike and Interest of Steel Business is Large —Governor Asks Board of Arbitration to Act

Chicago, April 26.—With 16,000 carpenters on strike for the past two weeks and a lockout enforced by contractors against other unions affiliated with the carpenters' organization, the situation has not yet cleared sufficiently to indicate whether peace in labor matters can be arrived at before May 1. A joint arbitration board, representing the Carpenters' District council and the Carpenters Contractors association, is hard at work seeking to reconcile the fighting interests. Offers by the state board of arbitration to act as umpire have been refused by both sides, a preference being expressed for arbitration by those who are more closely in touch with conditions.

The immediate cause of the strike was refusal of employers to grant 5 cents an hour increase, from 65 cents to 70 cents, and refusal of carpenters to accept an increase from 65 cents to 67½ cents per hour.

A strike in the building trades at present is regarded as a calamity, as an unusual quantity of building is in line for the present season. Among the large projects which will be halted, if the strike continues, are the Union railway terminal, on which $65,000,000 was to be expended; the Lyon & Healy building, the Kimball building, Marshall Field museum, Boston store annex, Morrison hotel second section and about 4,000 smaller structures scattered all over the city. The contracts for steel on many of these larger buildings have been let and delivery of the material must be stopped unless labor troubles are settled.

One feature of the struggle is the breaking-up of the alleged agreement between sheet metal manufacturers and unions which place this material. This agreement is said to have been in effect for several years and to have given Chicago manufacturers a monopoly of this material to an extent which has prevented sheet metal from outside the city being a competitor. In the whirligig of labor difficulties, this alleged agreement appears to have been broken and local manufacturers assert they will not discriminate against material from other cities for fear it will place them in a position of violating the Sherman anti-trust law. Sheet metal workmen have been locked out and the understanding thus is broken up.

The original cause bringing about the various strikes before the carpenters' wage agreement appeared was the effort by the Building Construction Employers' Association to put into effect an agreement which would allow material made in non-union shops outside the city to be placed by union workmen in Chicago. This was regarded by organized labor as a move toward the open shop and a number of the organizations refused to sign. With this as a start, various

other points were raised until almost the entire list of building trades is in difficulty. Although both employers and workers say they are in the fight to stay, a number of factors are being used to the best effect in an effort to bring about peace, as the strike, if long continued, will have a depressing effect on many lines of business just when enlarged activities are appearing after the long period of quiet marked by great unemployment.

The iron and steel interest in the present struggle is large, as many structures which promise to be held up involve considerable tonnage of structural material and in the smaller buildings much structural iron and sheet metal is involved.

Will Decide Shortly

Chicago, April 27. — After five months' consideration it is expected a decision will be rendered this week on the request of enginemen of western railroads for an increase in wages The board of arbitration began sessions Nov. 30 in this city and took a large quantity of testimony from railway officials and members of the employes' organization in regard to labor conditions affecting about 65,000 workers.

Arbitrators have been working hard and have given full consideration to each of the 16 articles in the request filed by the employes. Extreme secrecy has been maintained and no hint has been given as to how the decision is likely to read.

Socialist Defeated

After a Socialistic reign of four years, Granite City, Ill., which has a large foreign population, has thrown off the yoke of this party. The Socialist mayor, who served two terms and who was again nominated, was opposed by an independent candidate endorsed by the other parties and of the 4,076 votes polled, 2,618 were registered for the independent candidate, giving him a majority of 1,160. At Granite City are located the large foundries of the American Steel Foundries, Chicago, and the Commonwealth Steel Co., St. Louis, as well as the rolling mill and steel works of the National Enameling & Stamping Co.

Forging Society.—The recently organized American Drop Forging Society held a meeting last week at Pittsburgh, to further perfect the association. The society is supported by a number of prominent forging manufacturers. A monthly journal devoted to the manufacture of forgings will be issued. E. B. Horne, foundry superintendent, the Packard Motor Car Co., Detroit, is the editor of the journal, known as *The American Drop Forger*.

Exports Increase

While Imports Decline to Small Figures—Heavy Zinc Movement

The government summary of iron and steel imports and exports for February and for the eight months ending with February reported on a tonnage basis shows that imports dwindled to 7,505 tons, compared with 10,569 tons in January of this year and 14,756 tons in February of 1914. Imports of tin and terne plate decreased from 3,274 tons in February, 1914, to 265 tons last February.

IRON ORE IMPORTS, FEBRUARY

	Tons. 1915.	Tons. 1914.
Spain	.....	9,371
Sweden	19,566	26,770
Canada	2	65
Newfoundland and Labrador	.....	.....
Cuba	47,105	72,170
Other countries	12,100	4,198
Total	78,773	112,574

IRON AND STEEL IMPORTS, GROSS TONS.

	February, 1915.	February, 1914.	Eight m'ths ending February, 1915.	Eight m'ths ending February, 1914.
Scrap	2,050	1,342	23,456	21,111
Pig iron	1,687	3,871	81,866	82,602
Ingots, blooms, billets of steel	635	2,367	20,463	20,994
Wire rods	324	414	2,706	8,338
Rails	419	1,088	15,261	9,785
Bar iron	1,734	2,013	9,882	17,269
Structural	240	198	5,176	6,414
Sheets and plates	151	189	2,156	1,501
Tin and terne plate	265	3,274	4,555	16,055
Total	7,505	14,756	165,521	184,069

IRON AND STEEL EXPORTS, GROSS TONS.

	February, 1915.	February, 1914.	Eight months ending February. 1915.	Eight months ending February. 1914.
Scrap	3,017	5,221	13,627	56,812
Pig iron	14,178	9,456	66,453	153,293
Billets, ingots and blooms of steel	15,697	2,850	55,295	25,696
Wire rods	10,864	3,134	43,368	22,015
Steel rails	9,124	10,932	82,983	257,485
Steel bars	20,225	8,776	101,583	107,817
Iron bars	658	188	4,068	8,651
Struc. iron and steel	12,733	17,299	102,033	225,263
Hoop, band and scroll	1,161	463	7,206	8,055
Sheets and plates	19,931	26,557	158,308	252,826
Tin and terne plates	5,835	3,395	45,849	26,474
Barbed wire	5,874	4,789	73,430	54,636
All oth. wire	12,625	6,036	68,973	54,409
Cut nails	192	371	1,356	2,604
Wire nails	3,811	2,534	30,031	25,476
All oth. nails includ. tacks	435	171	2,421	2,167
Pipes & fitt'gs.	5,957	17,253	111,902	170,187
R. R. spikes	547	396	3,701	5,420
Bolts, nuts, rivets, washers	1,000	1,113	8,374	13,834
Horseshoes	326	114	6,028	820
Cast radiators	173	152	2,037	4,338
Total	144,363	121,205	989,026	1,478,278

Exports last February amounted to 144,363 tons compared with 139,788 tons in January of this year and 121,205 tons in February, 1914. Comparing February, 1915, with February, 1914, exports of billets increased from 2,850 to 15,697 tons; wire rods from 3,134 tons to 10,864 tons and steel bars from 8,776 to 20,225 tons. Structural iron and steel decreased from 17,299 tons in February, 1914, to 12,733 tons last February.

Last December, iron ore imports were suspended entirely, except from Cuba, from which island 51,053 tons were received. Shipments from Spain, Sweden and other countries were resumed in January, when the total imports amounted to 75,286 tons, while in February, 78,773 tons were imported.

In machinery, the value of the exports in February, 1915, were $7,936,467, compared with $8,048,568 in February, 1914, and $7,676,078 in January, 1915. In machine tools, February made a decided gain over the same month a year ago, but fell behind January, 1915, the figures being as follows: February, 1915, $2,523,722; February, 1914, $1,102,207; January, 1915, $2,903.740. Exports of commercial automobiles were 1,002 in February, 1915, valued at $3,022,482, while in February, 1914, only 57 were exported, valued at $83,461, and in January, 1915, 935 were exported, valued at $2,545,527. Exports of passenger automobiles for February show a good gain over January, 1914, the figures being 2,230 cars for February, valued at $1,785,330 and 1,803 cars in January, valued at $1,313,153. A striking contrast is afforded by the figures showing exports of agricultural implements and parts, the figures being as follows: February, 1915, $762,606; January, 1915, $429,745; February, 1914, $3,668,606.

The exports of zinc and manufactures of, except ore and dross, were valued at $2,089,399 in February, 1915, compared with $19,619 in February, 1914. For the eight months, the value was $12,663,271, compared with $281,502 for the eight months ending February, 1914.

Will Enlarge Pulaski Foundry

At a called meeting of the board of directors of the Pulaski Foundry & Machine Co., Inc., held in its office at Pulaski, Va., recently, the board decided to increase the capacity of the foundry and machine departments by additions to the building which will give the company approximately 6,000 square feet more floor space. The company also decided to buy several machine tools, including a 5-foot radial drill which it desires to install as soon as proper floor space can be prepared.

Large Ore Purchase

Purchases of Brazilian manganese ore by the United States Steel Corporation, made several months ago, as reported at the time, now it is learned totaled about 100,000 tons. This mineral is being obtained from the Ouro Preto mines in the state of Minas Geraes, the principal outlet of which previously had been to Germany and Belgium, with occasional shipments to this country. It now is thought that such relations will be established that the United States permanently will obtain a large tonnage of manganese ore from these mines. The ore purchased by the United States Steel Corporation, is being transported in vessels, operated by the United States & Brazil Steamship Co., which is controlled by the Corporation.

Greater attention continues to be paid by various companies to the development of manganese ore deposits in this country, which, as far as known, are small and have yielded only inconsequential tonnages. A carload of manganese ore, or about 40 tons from Gile county, Va., is understood to have been sold recently, at 40 cents per unit. The assay on this lot showed better than 48 per cent in manganese. This is said to have been the highest price yet paid for Virginia manganese ore.

Plan New Ship Yard

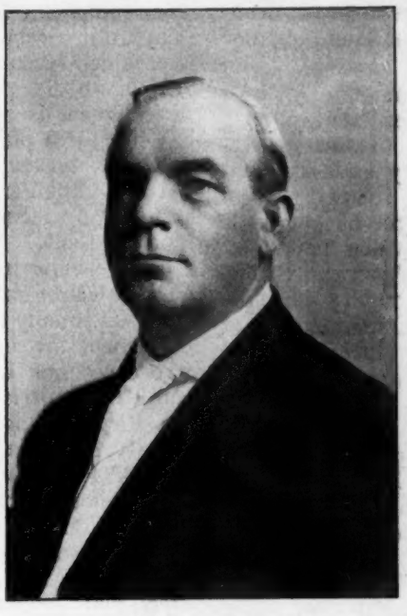
It is announced that the Samuel L. Moore Sons' Corporation, Elizabeth, N. J., which is a subsidiary of the Bethlehem Steel Co., is preparing plans for the erection of a new shipbuilding plant in that city, which is to be located on Staten Island Sound. The site formerly was occupied by the Lewis Nixon Crescent Shipyard Co. Application has been made to the Elizabeth city authorities to vacate certain streets which now traverse the site.

New Worcester Company

Worcester, Mass., is to have a new plant for the manufacture of ornamental iron and to do a general forging business, the Stafford Iron Works, Inc., which has been organized under the laws of Massachusetts with a capital stock of $50,000, having leased land on Stafford street in that city for that purpose, and will put up a modern plant. The officers of the company are: President, Charles F. Davis, of New York; treasurer, Matthias B. Walls, of New York; clerk, Thos. E. Aykroyd, of Auburn, Mass.; general manager, G. Stanley Walls, of Worcester, Mass.; directors, the foregoing and Albert Aykroyd, of Auburn, Mass. M. B. Walls was formerly superintendent of the Standard Plunger Elevator Co., of Worcester, Mass., and G. Stanley Walls, Thomas E. Aykroyd and his brother, Albert Aykroyd, were former employes of the Richard French iron works in Worcester. The new concern expects to be doing business this summer.

Obituaries

John H. Lloyd, formerly assistant to the president of the Morgan Engineering Co., Alliance, O., died in that city a few days ago, aged 56 years. Death was due to a complication of diseases and terminated an illness of more than a year. He was born at



JOHN H. LLOYD

Dowlais, Clamorganshire, Wales, July 27, 1859. In 1874, he entered the machine shop of the Dowlais Iron Co. and served an apprenticeship of five years. After spending a year as machinist at the Tredegar Iron Works, he returned to Dowlais and accepted a position as machinist. He was in the employ of the Dowlais Iron Co. until his departure for the United States.

Mr. Lloyd came to Alliance, O., May 10, 1882, and secured a position with his uncle, the late Thomas R. Morgan Sr., in the engineering department of Morgan, Williams & Co., now the Morgan Engineering Co. He was employed successively as draftsman, mechanical engineer, general superintendent and finally as assistant to the president. On account of ill health, Mr. Lloyd retired from active business about a year and a half ago. He was a member of the Iron and Steel Institute of Great Britain, his application for membership having been signed by two past presidents.

Ralph B. Francis, for 28 years proprietor of the Palmer Foundry Co., of Palmer, Mass., died at his home in that town recently, after a long illness, aged 59 years. About a year and a half ago he sold his interest in the company to Walter B. Taylor and retired from active business.

Antoine Florent Guillain, president of the Association of Metal and Mining Industries of France and of the Association of Electrical companies, died last week, according to a cable from Paris. M. Guillain was 71 years of age, was a director of the Suez Canal Co. and was connected with other important enterprises in France and other countries.

Peter Marschall, vice president of the Hansell-Elcock Co., Chicago, died Tuesday of last week, aged 72 years. He was a native of Germany and came to this country in 1866 and followed his trade as iron molder. When the Hansell-Elcock company was organized a little over 25 years ago, he entered its employ as superintendent and later became vice president.

Electrical Engineers

R. S. Wile, president Wile Electric Furnace Co., Pittsburgh, will talk about "The Electric Furnace and the Melting of Alloys", May 1, at the regular monthly meeting of the Association of Iron and Steel Electrical Engineers, which will follow a dinner at the Seventh Avenue hotel, Pittsburgh. W. T. Snyder, secretary of the association, announces that the last meeting of the year will be held June 5, when topics of general interest will be discussed. The annual convention of the society will be held Sept. 8, 9, 10 and 11 at the Hotel Statler, Detroit. A. H. Swartz, Churchill avenue, Cleveland, is chairman of the convention committee.

Bridgeport Projectile Co., recently incorporated to manufacture projectiles, and which has been referred to in *The Iron Trade Review* as a heavy buyer of machine tools, has opened an office in the Security building at Bridgeport, Conn., with James C. Knight, president of the company, in charge.

The W. B. Pollock Co., Youngstown, will furnish steel tanks for the proposed benzol plant of the Republic Iron & Steel Co., that city.

Now Come Hints of Labor Troubles

Strikes a Possibility in Plants of Machine Tool Builders—War Orders Still Predominate—Some Increase in Railroad Inquiry

THREATENED labor troubles now are causing considerable anxiety in the machine tool trade. During the past week the employes at several plants which are operating day and night because of the war demand made certain representations to their employers in regard to wages and other conditions. At other plants the men are displaying symptoms which are regarded with concern. From the manner in which this development became apparent simultaneously in different parts of the country, it is considered possible in some quarters that the movement may be a general one. The discontent so far is most noticeable at several of the plants which are engaged to capacity in making tools for use on war supplies. At at least two such plants strikes are considered possible. Trouble also appears to be brewing at plants manufacturing war supplies, not only shrapnel and ammunition, but shoes, uniforms, etc.

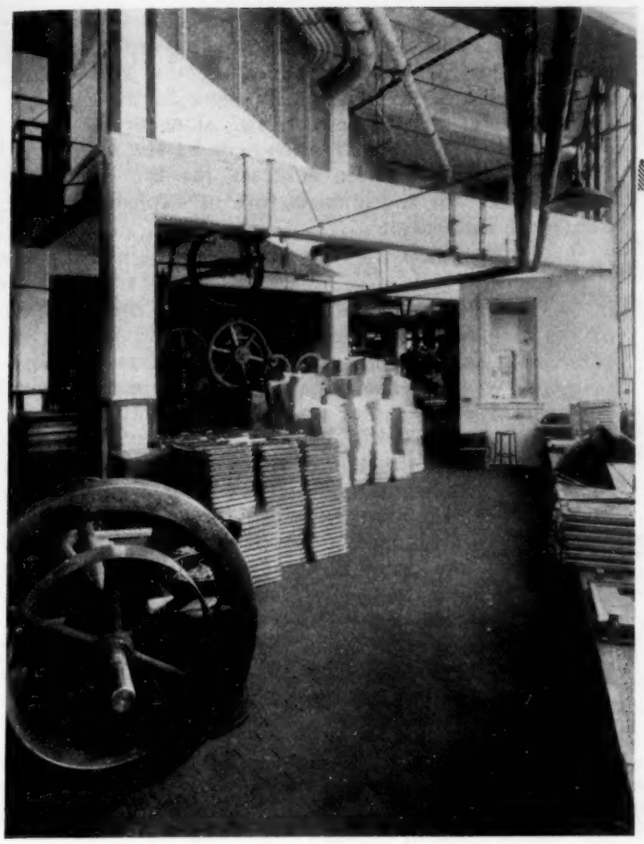
War business continues to predominate in the machine tool market. Of most interest, naturally, is the announcement of the disposition of the sub-lettings of the Canadian Car & Foundry Co.'s Russian projectile contract; this appears on a following page. The Canadian Car & Foundry Co. still has business to sublet and among the concerns which have just begun to figure on such work are the American Bridge Co., the American Brake Shoe & Foundry Co., the Ingersoll-Rand Co., the Prest-O-Lite Co., Indianapolis, and others. The Canadian company now is willing to sublet smaller contracts than previously was the case and any concern can get into this work by agreeing to turn out as few as 50 shells a day. These negotiations are being conducted at the Canadian company's office at 30 Church street, New York.

The American Locomotive Co. up to the present has purchased equipment to the value of more than $1,000,000 for making projectiles. It finally develops, after sifting all the rumors in regard to this business that the contract on which the Locomotive company originally figured involved projectiles having a total value of about $70,000,000; of this the Locomotive company secured $35,000,000, while the remainder was divided between the New York Air Brake Co. and Westinghouse interests. The Locomotive company, it is understood, will turn out all the shrapnel casings involved. The relative quantities of shrapnel and high explosive shells to be made under these contracts have not yet been definitely decided upon. In addition to the above contract, the American Locomotive Co. is figuring on a $10,000,000 sub-contract from the Canadian Car & Foundry Co. Incidentally the New York Air Brake Co. has released all the contracts for machine tools which it recently placed and deliveries of this machinery are being rushed. Both the Locomotive company and the New York Air Brake Co. placed further machine tool orders last week. Among other war buyers during the week were the Bridgeport Projectile Co., Bridgeport, Conn., the Remington Arms-Union Metallic Cartridge Co., Bridgeport, the Bethlehem Steel Co., and the Snead & Co. Iron Works, Jersey City, N. J., all of whom made purchases in addition to those noted in previous issues of *The Iron Trade Review*. There is considerable excitement in the market in the east relative to a contract for 1,000,000 rifles on which several concerns are bidding. At least two of these companies have issued large lists of rifle-making machinery, and one has begun negotiations for the purchase of the plant of the New Haven Mfg. Co., New Haven, Conn., which will be fitted up immediately for the manufacture of rifles if this concern proves a successful bidder. A contract for 1,000,000 bayonets to go with these rifles has been distributed among three concerns.

Among the purely domestic purchases those of the Seaboard Air Line were the largest. This road bought some $50,000 worth of tools, including a driving wheel lathe, an engine lathe, a planer, a boring mill, etc. This equipment is to be used temporarily by the company until it rebuilds its machine shops at Portsmouth, Va., which recently were burned. Large requirements remain to be purchased. The only other railroad development is an inquiry put out by the Chesapeake & Ohio for a planer and a vertical turret lathe. It is expected, however, that inquiries shortly will be put out by the Pennsylvania railroad. The Champion Lumber Co., Sunburst, N. C., is inquiring for six machine tools. J. G. White Co., Exchange place, New York, is inquiring for 11 machine tools for the Dan Patch electric railways, Minneapolis. The Bethlehem Steel Co. finally has placed contracts for the unloading equipment for an ore dock at Constable Hook, N. J.; it ordered one 15-ton Hulett unloader and one three-ton Mead-Morrison unloading apparatus. The Warren Foundry & Machine Co. finally has issued a formal inquiry for 11 cranes for its plant at Easton, Pa. The city of Perth Amboy, N. J., is in the market for a power house crane. Dr. Z. T. K. Woo, president of the Hangyeh Ping Iron & Steel Co., China, has returned to this country and is expected to close during his stay on considerable blast furnace and steel plant equipment. Mail addressed to him care the Marseilles hotel, New York, will be forwarded to Dr. Woo.

More Railroad Buying in Chicago

Buying of machine tools for domestic use is increasing steadily and adds materially to the volume of business now coming to Chicago dealers on account of European war demand. Sellers express the opinion that a sudden withdrawal of European inquiries would still leave a satisfactory volume of business from American consumers. The sales to shops in the United States cover a wide range of requirements and seem to come from a variety of institutions, indicating a resumption of activity in many lines. Visits of buyers from the east to this market during the past week have resulted in sales of several dozen lathes destined for European use. One dealer disposed of 20 lathes of one size in one transaction, which are to be shipped to Boston and from there to Europe. A buyer recently picked up a carload of lathes here which will go to England for war use. Much of the machinery now going to the east is being diverted to Canada and sellers in the west do not know whether the orders



To the left is shown an installation of Ayer & Lord Interior Wood Blocks in the assembling room of the *Cleveland Foundry Co., Cleveland,* manufacturers of Blue Flame Oil Stoves. This floor is withstanding, without sign of ill effect, all the severe treatment which might be expected under such conditions—the moving about of heavy machinery, machinery parts, etc.

Below is shown an Ayer & Lord Interior Wood Block Flooring in the machine shop of the Electric Controller & Mfg. Co., Cleveland, where Magnets and Controllers are made. Here the roughest of machine shop conditions must be dealt with—the constant moving about of heavy castings, excessive trucking, etc., yet the flooring remains intact.

Let us send you our little booklet "Floors"

Ayer & Lord Tie Company

General Office, Railway Exchange, Chicago

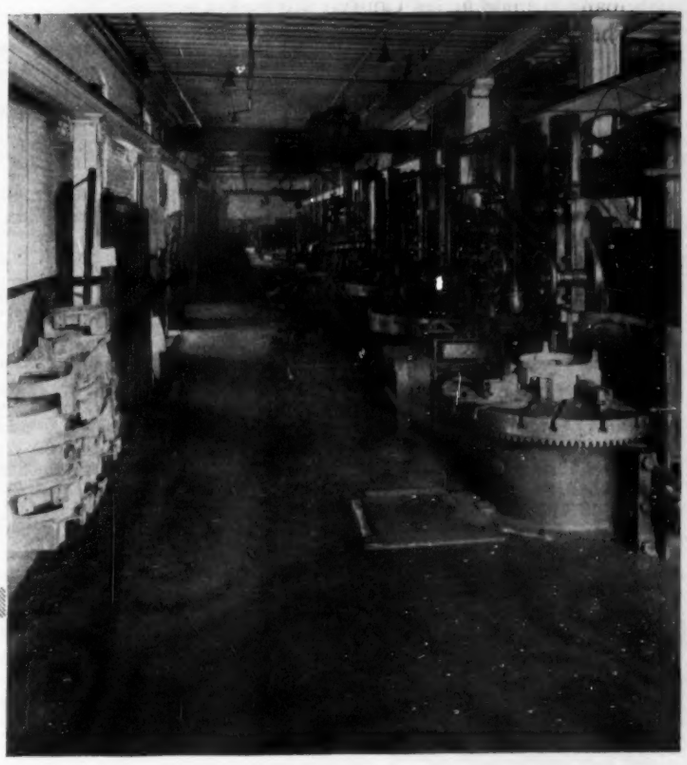
CLEVELAND, OHIO—926 Illuminating Bldg.
KANSAS CITY, MO.—1117 Rialto Bldg.
MEMPHIS, TENN.—1402 Exchange Bldg.
PHILADELPHIA, PA.—319 Perry Bldg.

"Highly Recommend It"

"A year ago we floored one end of our mill with the Ayer & Lord Tie Company's Blocks with results that are entirely satisfactory. During the month of November we put down another section of the same material, which is *the best evidence that we are pleased with the blocks and the completed floor.*

"The practice is to spread a body of molding sand about 1½ inches thick on which the blocks are set and tamped or rolled to equalize any slight difference in height.

"Our flooring stood well under severe treatment and we highly recommend it for rolling mills or other factories where heavy weights are moved by trucks."



are shipped further or are used in that country.

Bids have been received on the Burlington's recent list and awards are expected shortly. The Santa Fe is picking up a few tools but general awards on its recent list have not been made. The following tools are asked for by the Missouri, Oklahoma & Gulf railway, through the Arnold Co., of Chicago: Five lathes, five grinders, three boring mills, two drills, two presses, a planer, a universal milling machine, a portable crane and hoist, a portable valve facing machine, portable valve setting rollers, a triple head bolt cutter, a pipe cutting and threading machine, a draw cut shaper, a bar shear, six portable vises, a 3,300-pound steam hammer, a forging machine and bulldozer, a 2-inch bolt header and forging machine, a pressure blower, a case hardening and spring furnace, a 500-pound belt driven hammer, 12-foot bending rolls, and a 12-foot flanging clamp.

Westinghouse Purchases Completed

Pittsburgh machinery dealers this month will smash to pieces all records for activity for the past two years. Bookings have been comparatively heavy and there is every indication of a continued increase in the volume of business. The Westinghouse interests, which have taken additional contracts for export, say they have completed their program for the purchase of machine tools for the present. They have purchased 500 tools, according to conservative estimates. The McKeesport Tin Plate Co. is expected to award contracts for new equipment for its tin plate mill extension at McKeesport, Pa. One of the builders of heavy rolling mill machinery in the Pittsburgh district is working on a contract for the equipment of a factory for the manufacture of explosives to be located at Pittsburgh.

More Activity in Dayton

In Cincinnati, the source of activity in the purchase of machine tools has shifted, the demand now being principally from domestic concerns. Indirectly, however, the war is responsible for most of the business. An order for 250 lathes was placed recently with the American Tool Works Co. by the American Locomotive Co. over the telephone so as to lost no time in securing shipments. The Recording & Computing Machine Co., Dayton, O., will equip the plant of the Speedwell Motor Car Co., which it has leased, to turn out a large war order received through the Canadian Car & Foundry Co. The Dayton Mfg. Co., Dayton, O., will also buy some lathes for work on shrapnel. Deliveries on orders placed today are not usually promised to begin until June or July, as all lathe builders are booked to full capacity until that date.

EASTERN STATES

WINDSOR, VT.—Windsor Machine Co. has awarded the contract for the construction of a 1-story, 140 x 180-foot, brick and steel machine shop to Fred T. Ley Co., Springfield, Mass.

BOSTON.—Johnson Vapor Heating Co. has been incorporated; $30,000 capital stock; by Nelson B. Johnson, John M. Sewell, James Woodward.

BOSTON. — E. B. Bishop will build a 1-story and basement, 140 x 178-foot factory building. Monks & Johnson, 78 Devonshire street, architects, have received bids.

BOSTON. — Lewis-Shepard Co. has been incorporated to manufacture motors and machinery; $50,000 capital stock; by Arthur L. Lewis, Frederick J. Shepard Jr. and W. Lloyd Allen.

BRIGHTON, MASS.—Carnegie Steel Co., which recently opened a plant in Brighton, will erect an office building.

LOWELL, MASS.—M. F. Smith Heating Co. has been incorporated; $100,000 capital stock; by Marshall F. Smith, Leonard Tillinghast, Clinton B. Tillinghast.

LYNN, MASS.—Local capital and outside interests are preparing plans for the establishment of a $1,000,000 plant to specialize in the manufacture of drills for the shoe trade. The first unit spoken of is 35,000 looms. The building plans would call for a 50 x 700-foot mill with a warehouse nearly as long running parallel. It is understood about four-fifths of the capital needed has been secured.

RANDOLPH, MASS. — Randolph Wire Works Co. has been incorporated; $25,000 capital stock; by Thomas H. Mahoney, Lillian M. Marguire and Frank Diante.

SPRINGFIELD, MASS. — Geo. D. Cockhinas, 69 Patten street, is erecting a 2-story, 50 x 25-foot, light manufacturing building.

SPRINGFIELD, MASS. — Milton Bradley Co. has begun work on a 4-story and basement addition to its plant on Cross street.

SPRINGFIELD, MASS.—Cutler Construction Co. has been incorporated; $50,000 capital stock; by Paul W. Culter, Hattie W. Culter, Harlan P. Small.

SPRINGFIELD, MASS. — Schmelzer & Arthur Mfg. Co., foundry and machine shop, has been incorporated; $50,000 capital stock; by Anton C. Schmelzer, Benjamin F. Arthur.

WORCESTER, MASS. — Worcester Pressed Steel Co.'s plant suffered about $15,000 damage by fire.

WORCESTER, MASS. — Steward-Skinner Co., Inc., manufacturer of hardware specialties, has leased two floors in the Barsky building and will move to these larger quarters May 1.

WORCESTER, MASS. — Stafford Iron Works, Inc., has been incorporated; $50,000 capital stock; by Matthias B. Walls, Thomas E. Aykroyd, G. Stanley Walls.

WORCESTER, MASS.—Graton & Knight Mfg. Co. will erect a $3,500, 4-story, 24 x 28-foot, brick addition for general manufacturing purposes.

WORCESTER, MASS.—R. P. Power Foundry Co., which recently started business in a new foundry building, making a specialty of general castings, has rough plans for several buildings which will be erected as fast as required.

BRIDGEPORT, CONN.—Locomobile Co. of America, in addition to an extension at its Seaside Park plant has rented the new factory recently built by the Bridgeport Engineering Co.

BRIDGEPORT, CONN.—Among the additions which the Remington Arms-Union Metallic Cartridge Co. has completed or commenced since last September, are the following: Three buildings in Barnum avenue, each 64 x 288 feet; two in Seaview avenue, each 48 x 220 feet; three in Boston avenue, each 65 x 362 feet; one in Boston avenue, 64 x 192 feet; five in Boston avenue, each 140 x 352 feet and one in Boston avenue, 90 x 121 feet. The value of these buildings is approximately $1,583,000. The company has more new buildings in process.

EAST HARTFORD, CONN. — Noble & Westbrook Mfg. Co., which was incorporated in May, 1913, will buy land north of its present location on Westbrook street for the erection of a drop forge shop.

HARTFORD, CONN. — Hartford Machine Screw Co. will commence work at once on a $75,000, 5-story, 50 x 206-foot factory addition. Plans call also for a brick and limestone office building having a 70-foot frontage.

NEW BRITAIN, CONN.—Landers, Frary & Clark, hardware manufacturers, have awarded a contract to J. H. Grobier Co., for the erection of a tinning shop, 30 x 240 feet, and a forge shop, 12 x 40 feet.

NEW BRITAIN, CONN.—Hart & Cooley Co., manufacturer of hot water registers, has awarded a contract to the B. H. Hibbard Co. to build a $15,000 addition to its plant, raising a 1-story building to three stories.

NEW HAVEN, CONN. — Plant of New Haven Mfg. Co., of which C. E. Thompson is president, is being negotiated for by a concern which is figuring on a contract to manufacture gun barrels.

TORRINGTON, CONN.—Hendey Machine Co. has started work on a 1-story, 60 x 90-foot factory building and has plans prepared for a large foundry to be erected sometime in in the future.

BRISTOL, R. I.—Bristol Marine Industries Co. has been incorporated for manufacturing purposes; $5,000 capital stock; by Edward H. Wardwell, Grandville P. Lindley, Stephen W. Hopkins.

ALBANY, N. Y.—Tri-City Motor Co. has increased its capital stock from $10,000 to $20,000.

BROOKLYN. — Fred Gretsch Mfg. Co., South Fourth street, Brooklyn, will build a 10-story, 80 x 250-foot plant for the manufacture of musical instruments.

BROOKLYN.—American Machine & Foundry Co. will start work shortly on the erection of a $250,000 4-story, 73 x 700-foot factory building at Fifty-sixth street and Second avenue; Francisco and Jacobus are the architects.

BUFFALO.—Buffalo Forge Co. is working on plans for a 5-story, 125 x 200-foot addition to its erecting shop on Broadway and Tousey street.

ELMIRA, N. Y.—Compton Realty Co. has the general contract for a 1-story, 179 x 450-foot addition to the plant of the Morrow Mfg. Co.

HAMMOND, N. Y.—Hammond Light & Power Co. has been incorporated; $25,000 capital stock; by F. H. Bertrand, Milton and W. S. Soper, Hammond.

JAMESTOWN, N. Y.—Gabrielson Car Parts Mfg. Co. has increased its capital stock from $35,000 to $100,000.

JAMESTOWN, N. Y.—Gurney Ball Bear-

ing Co., Jamestown, has appointed F. P. Sheldon & Sons, 603 Industrial Trust building, Providence, R. I., to draw plans for a new plant.

NEW YORK.—J. G. White Co., Exchange place, is taking bids on 11 machine tools, to be installed in the shops of the Dan Patch electric railways, Minneapolis.

NEW YORK.—Cooling Tower Co., cooling appliances, structural work, steel, iron and metal products, has been incorporated; $10,000 capital stock; by L. A. Phillips, B. H. Coffey, A. B. Tappen, Ossining, N. Y.

NEW YORK.—American Hazapfel Composition Co., 18 Bradway, will build a 1-story, 50 x 186-foot plant, with 1-story, 35 x 50-foot power house at Kenilworth, N. J. Jos. Broome, 123 Liberty street, New York, is the engineer.

NEW YORK.—Seaboard Air Line has closed for $50,000 worth of tools, approximately, to replace tools damaged recently in the fire at the shops at Portsmouth, Va. Work on the rebuilding of these shops has been commenced. Large requirements remain to be purchased later on.

SCHENECTADY, N. Y.—Mica Insulator Co. has begun work on an addition.

TROY, N. Y.—H. G. Hammett will erect a 1-story, 50 x 65-foot addition to his machine shop on Eighth avenue. Architect E. W. Loth, 253 Broadway, Troy, is taking bids.

ALTOONA, PA.—Harry Botham, Norfolk, Va., is contemplating a location in Altoona for a $500,000 hotel.

BRISTOL, PA.—Jos R. Grundy & Co., have let the contract for a 2-story, 111 x 176-foot power house.

EASTON, PA.—Warren Foundry & Machine Co. has put out a formal inquiry for 11 cranes.

ERIE, PA.—The Erie Mfg. & Supply Co., manufacturer of machinery supplies, is having plans completed for an extensive addition.

ERIE, PA.—Erie Lighting Co. will construct sub-power stations in Corry, Union City and Waterford, to supply electric light and power to those cities.

ERIE, PA.—Chester & Fleming, Pittsburgh engineers, have been engaged to prepare plans and specifications for extensive improvements to the high service distribution system of this city.

GREENSBURG, PA.—A $250,000 hospital will be erected here in Seton Hill, by which name it will be known; Thomas H. Strickler, Pittsburgh, has been in Greenburg to raise necessary funds.

HARMONY, PA.—Chester & Fleming, Pittsburgh, have been engaged to survey for two new impounding dams on Connoquenessing creek; work will be undertaken by the Pittsburgh, Harmony, Butler & New Castle railroad.

LANCASTER, PA.—Architect J. B. Harman, Dickson building, is drawing plans for a 1-story, 40 x 100-foot manufacturing building. The name of the owner is withheld.

NORTH EAST, PA. — Electrical Material Co. is asking bids on proposed extensions of buildings which will cost approximately $100,000. The following buildings will be erected; a machine shop, 35 x 120 feet; a forge shop, 40 x 90 feet; a foundry, 40 x 90 feet and a power house, 24 x 66 feet. O. O. Hertzel is president of the company.

PHILADELPHIA.—Lotz Bros., 1825 South Front street, have let contract for a 2-story, 35 x 105-foot addition.

PHILADELPHIA. — Strawbridge & Chase Wire Co. is planning additions to its Audubon plant.

PHILADELPHIA. — Schartz Wheel Co., Tulip and Bleigh streets, have let contracts for two storage sheds, each 1-story, 32 x 150 feet.

PHILADELPHIA. — Hess-Bright Mfg. Co. has let contract to Harrison C. Rea for

How America Figures in Big War Order

The Canadian Car & Foundry Co., according to the Journal of Commerce, New York, has sublet contracts to 37 American companies, to the extent of $21,724,000, *on its contract for* $83,000,000 *worth of shrapnel and howitzer shells for the Russian government. Four other sub-contracts which are still pending, involve a total value of* $30,104,330. *The Canadian company's order calls for* 5,000,000 *shells, at an average cost price of* $17.85. *The list of sublet contracts, placed and pending, follows:*

Sub-Contracts Awarded

Participating Company.	Value.
Hydrauic Pressed Steel Co., Cleveland, O.	$475,000
American Rolling Mill Co., Middletown, O.	930,000
Barney & Smith Car Co., Dayton, O.	1,122,000
Page & Storms Drop Forge Co., Chicopee, Mass.	202,500
American Car & Fdy. Co., New York	96,000
Dayton Mfg. Co., Dayton, O.	463,000
Federal Pressed Steel Co., Milwaukee, Wis.	1,850,000
Northern Electric Co., Montreal, Can.	275,000
United Lead Co., New York.	280,000
Recording & Computing Machine Co., Dayton, O.	6,000,000
King Powder Co., King's Mills, O.	130,000
American Tube & Stamping Co., Bridgeport, Conn.	67,500
Michigan Brass & Copper Co., Detroit, Mich.	2,400,000
American Brass Co., Kenosha, Wis.	375,000
*Auto Parts Mfg. Co., Detroit, Mich.	650,000
*Vermont Farm Machine Co., Bellows Falls, Vt.	650,000
*Consolidated Mfg. Co., Toledo, O.	550,000
Robin Hood Ammunition Co., Swanton, Vt.	15,000
Wallace Barnes Co., Bristol, Conn.	35,900
Lavigne Mfg. Co., Detroit, Mich.	21,000
Draper Co., Hopedale, Mass.	14,000
Pope Mfg. Co., Westfield, Mass.	42,000
The Yale & Towne Mfg. Co., New York City	71,000
American Powder Wks. Co., Boston, Mass.	50,000
Corbin Screw Corp., New Britain, Conn.	52,000
Horatio Hickok Co., Burlington, Vt.	175,000
U. S. Steel Products Co., New York City.	840,000
Meade, Morrison Co., Boston	900,000
Crocker Wheeler Co., Ampere, N. J.	450,000
Platt Iron Works, Dayton, O., and Brownell Co., jointly.	630,000
Lauzon Engrg. Co., Levis, Que.	180,000
†Dayton Mfg. Co., Dayton, O.	320,000
Worcester Mfg. Co., Worcester, Mass.	480,500
†Page & Storms Drop Forge Co., Chicopee, Mass.	50,000
Blake & Johnson Co., Waterbury, Conn.	22,000
Bridgeport White Metals Casting Co.	360,000
†Corbin Screw Corporation	100,000
Total	$21,724,400

Sub-Contracts Pending

American Locomotive Co.	$10,000,000
Pressed Steel Car Co.	10,000,000
U. S. Cartridge Co.	10,000,000
Dayton Mfg. Co.	104,330
Total	$30,104,330

*Finishing only—furnish no parts.
†Additional.

1-story, 40 x 180-foot machine shop, to be erected at Second street and Erie avenue.

PHILADELPHIA, — Pouckert & Wunder, 310 Chestnut street, are drawing plans for a 1 and 2-story factory to be built at Hagerstown, Md. Name of owner withheld.

PHILADELPHIA.—Wm. Cramp & Sons Ship & Engine Building Co. will erect a brick and concrete pattern storage, two stories, 77 x 110 feet.

PITTSBURGH.—Bids will be let this week for the erection of a second tower addition to the industry group of the Carnegie Institute of Technology.

PITTSBURGH.—Swickley Amusement Co. has engaged Architects Vrydaugh & Wolfe to draw plans for a theater building at Swickley, Pa., a suburb.

PITTSBURGH.—P. H. Butler Co., grocer, has awarded the George Hogg Co., this city, a contract for a $75,000 warehouse building, to be erected at the corner of Seventeenth and Pike streets.

PITTSBURGH.—Carnegie Steel Co. has not yet closed contracts for machine tools and equipment for its new finishing plant for steel ties at Munhall, Pa.; a large punch probably will be purchased this week.

PITTSBURGH. — McKeesport Tin Plate Co., McKeesport, Pa., which plans to double capacity by installing 20 additional hot mills, may let contracts for the new buildings and equipment this week; it is understood most of the equipment will be purchased as soon as plans are accepted.

PITTSBURGH. — Pittsburgh Steel Car Co., capital $100,000, has been incorported at Dover, Del., to manufacture and deal in steel railroad cars; incorporators: Norman P. Coffin, Herbert E. Latter, both of Wilmington, Del., and Clement M. Enger, Elkton, Md.

PITTSBURGH. — Oil & Gas Development Co., capitalized at $200,900, has been incorporated by S. H. Burke, G. A. Shearer and L. S. Dorsey, all of Wilmington, Del., to produce and transport crude oil and pipe same in western Pennsylvania; understood the company will have headquarters at Pittsburgh.

PITTSBURGH.—Bids will be received until May 12 on the erection of a municipal building to be located in Mifflin township, Allegheny county; plans and specifications may be obtained from A. G. Wickerham, architect, 517 McClure street, Homestead, Pa.; John E. Luthy, Homestead, R. F. D. No. 1, is secretary of the board of Mifflin township.

PITTSBURGH. — Dravo Construction Co., Diamond Bank building, has received a contract for building two miles of double track railroad and an overhead bridge of steel construction for the Ohio & Pennsylvania Belt Line railroad; the track extension will skirt the new open hearth steel plant of the Youngstown Iron & Steel Co., Youngstown.

PITTSBURGH.—A charter has been issued for the Union Signal Construction Co. at Dover, Del., to manufacture, buy, sell and deal in all kinds of railroad supplies, including signal apparatus; capital stock, $10,000; incorporators: W. D. Uptegraff, Pittsburgh; T. W. Siemon and T. S. Grubbs, Edgewood. Messrs Uptegraff and Siemon are officers of the Union Switch & Signal Co., a Westinghouse interest.

ATHENIA, N. J. — Richardson Scale Co. will build a 1-story, 55 x 100-foot addition. Elwyn E. Seelye, 101 Park avenue, New York, has plans in progress.

HAMPTON, N. J.—Hampton Light & Power Co. has been incorporated to operate light and power plants; $50,000 capital stock; by John A. Power, P. L. E. Del Fungo Giera, E. P. Baylor.

HIGHSTOWN, N. J.—Smyrna Rug Co., main offices at Fifth avenue and Twenty-sixth

streets, New York, will erect a new $75,000 plant; J. V. Davison, president.

JERSEY CITY, N. J.—Colgate & Co. will erect an 8-story, 100 x 200-foot addition. Warren B. Davey, 105 Hudson street, Jersey City, is the engineer.

NEWARK, N. J.—Universal Caster & Foundry Co. will build an $11,000 addition. Architect F. H. Ogden, 9 Clinton street, Newark, is taking bids.

NEWARK, N. J.—American Piston Mfg. Co., 378 Jelliff avenue, has let contract to Essex Construction Co. for 1-story, 75 x 156-foot plant, to be erected on South Tenth street, near Avon avenue.

NEW BRUNSWICK, N. J.—Bayuk Bros., Third and Chestnut streets, Philadelphia, have received bids for a 4-story and basement, 90 x 100-foot factory to be erected in New Brunswick.

PERTH AMBOY, N. J.—Chesebrough Mfg. Co., manufacturer of vaseline, is receiving bids on a 4-story plant addition.

PHILLIPSBURG, N. J.—Reynolds & Tirrell, silk mill owners, have purchased a 9-acre site and will erect a 90 x 130-foot, brick mill.

TRENTON, N. J.—Empire Rubber Co. has let contract for two buildings 2-story, 60 x 90 feet, and 3-story, 40 x 75 feet. Work has been started.

TRENTON, N. J.—Texas Oil Co. will erect a $15,000 plant at New York and Ferrier streets, to include a storehouse, pump house, office building and tanks; all buildings will be fireproof.

WILMINGTON, DEL.—Chas. K. Tindall & Sons, have a contract on a 2-story and basement, 50 x 80-foot machine shop, to be erected for the National Machine Co.

BALTIMORE.—Wm. Kilkens has let the contract to the Consolidated Engineering Co., Calvert building, for a 3-story addition to his factory at Wilkens and Frederick avenues.

BALTIMORE. — Chesapeake Iron Works, Bayard and Severn streets, has completed plans for a 2-story factory building, 62 x 120 feet, on Bush street, near the Baltimore & Ohio railroad tracks.

CENTRAL STATES

AKRON, O.—Goodrich Tire & Rubber Co. will erect a large warehouse addition this summer.

AKRON, O.—All towns along the proposed interurban west of here, including Smithville, have raised bonuses except Wadsworth and Rittman.

ALLIANCE, O.—A movement has been started for the construction of a subway near Rockhill avenue, where the crossing of 13 tracks at a grade may be eliminated.

CANTON, O.—Ohio Sheet Metal Co. has been incorporated; $50,000 capital stock; by J. E. Eller, William H. and Pearl I. Gardner, P. C. Graf, J. S. Jeffers.

CANTON, O.—Gordon Rubber Co., which recently increased its capital stock from $300,000 to $500,000, has purchased property for additional buildings to be erected this summer, including a tire building, 28 x 100 feet, and a sundry department, 37 x 110 feet.

CHILLICOTHE, O.—Capitol Construction Co., Columbus, O., has the contract for a riveted steel bridge, with creosoted block floor, at $13,000. Mt. Vernon Bridge Co. has a contract for another structure at its bid of $22,000.

CINCINNATI.—Boye & Emmes Machine Tool Co., Spring Grove avenue, will enlarge its plant to a total floor space of 26,000 square feet.

CINCINNATI. — The single-track bridge of the Cincinnati Southern railroad across the Ohio river will be changed into a double track structure. Work is expected to begin in two months. An issue of $2,500,000 of bonds has been authorized for this work. About 1,000 tons of steel will be required.

CINCINNATI.—The Cincinnati approach to the suspension bridge, which spans the Ohio river, will be extended four squares in order to place it above the flood line. The work will cost about $600,000, including the real estate to be purchased, and will require a considerable amount of structural steel. Definite plans have not been prepared.

CLEVELAND.—Van Dorn Iron Works has increased its capital stock from $150,000 to $350,000.

CLEVELAND.—Poese Machinery & Mfg. Co. has been incorporated; $10,000 capital stock; by B. M. Merrills, J. L. Ossman, C. B. McPeck and H. S. Heinemann.

CLEVELAND.—Van Dorn Iron Works has a permit for the erection of a $10,000, 85 x 180-foot machine shop at Euclid avenue and East Seventy-ninth street.

CLEVELAND.—DeMooy Machine Co., automobiles, has been incorporated; $10,000 capital stock; by Herbert O. Evans, George W. Heinkel, J. E. Mathews, Arnold Ruetschi and G. H. Knippenberg.

CLEVELAND.—Hydraulic Pressed Steel Co. will build a $25,000, 2-story, brick and steel plant during the summer at 3152 East Sixty-first street, for the manufacture of steel barrels.

CLEVELAND. — Commissioner of purchases and supplies will receive bids until noon, May 7, for rotary converters, transformers and switching equipment for the municipal electric light department.

CLEVELAND.—Bryant Heater Co. has plans prepared for its proposed $50,000, 3-story, brick, steel and frame factory to be erected at 952 East Seventy-second street; Fox & Osborn, 1602 Woodward avenue, are the architects.

CLEVELAND.—C. E. Taft, whose woodworking plant on Columbus road was badly damaged by fire recently, has a permit for alterations of a factory at 1676 Central avenune, to be enlarged and occupied within two months; expenditures about $9,000.

CLEVELAND.—W. R. McCornack, architect for the school board, is drawing plans for a new high school of commerce and administration building in the down town district, to cost about $1,000,000. It is expected a bond issue for this amount will be voted upon at the fall election.

CLEVELAND.—Commissioner of purchases and supplies will receive bids until noon, May 6, for a tunneling machine for the west side tunnel construction; separate bids also will be received at that time for venturi meters for the Division avenue pumping station and also on that date for steam and feed water piping for the Division avenue pumping station.

CLEVELAND.—The electric lines entering Cleveland and all Cuyahoga valley steam lines, incuding the Baltimore & Ohio, Wheeling & Lake Erie, the Erie, the Nickel Plate and the Cleveland & Youngstown railroads will proceed with the terminal project at Prospect and Ontario avenues, the general assembly at Columbus having passed on the enabling act. O. P. and M. J. Van Sweringen, Marshall building, are representing the promoters. F. A. Pease Engineering Co. is the engineer.

DAYTON, O.—The Dayton Mfg. Co. is purchasing machine shop equipment for machining parts of shrapnel shells.

DAYTON, O. — Computing & Recording Machine Co. will equip the former plant of the Speedwell Motor Car Co. to manufacture a device for timing the explosion of shrapnel shells.

FOSTORIA, O.—Beckwith Railway Frog Signal Co., recently organized in Fostoria with $100,000 capital stock, is seeking a location for the erection of a factory.

HAMILTON, O.—Plans have been completed for a 730-foot bridge over the Miami river at Wood street; estimated cost is $116,000.

LORAIN, O.—City and Baltimore & Ohio railroad officials have reconsidered the proposition of straightening the Black river south of the viaduct, and building new docks and coal tipple to cost in all $200,000; the improvements probably will be made.

MANSFIELD, O.—Mansfield Sheet & Tinplate Co. has awarded a contract to Hughes-Kennan Co. for an addition, 60 x 140 feet. New equipment will include 13 stands of rolls and a roughing mill.

ORRVILLE, O.—Board of trade is negotiating for a machine company.

PAINESVILLE, O.—The city council has passed an ordinance for the issue of $35,000 in bonds to buy new equipment for the municipal light plant.

PIQUA, O.—Piqua Machine & Boiler Co., water tube boilers for stationary purposes, has been incorporated; $10,000 capital stock; by John F. O'Brien, Carl H. Herwig, Otto A. and Forrest C. Simon.

SPRINGFIELD, O. — It is announced the Bowlus-Hackett Co. will begin May 1 on the erection of an $80,000, 3-story commission and storage plant on West Washington street.

SIDNEY, O.—Clinton Fire Extinguisher Co., which recently increased its capital stock from $5,000 to $10,000 will install new machinery for the manufacture of the babcock type of liquid extinguishers. William Shine is president and manager.

TOLEDO, O.—Toledo Vitrified Brick Co., clay products, has been incorporated; $50,000 capital stock; by William F. Pioch William Urschel, C. W. Brannan, J. J. Urschel and E. S. Smith.

TOLEDO, O.—Toledo Mfg. & Supply Co., has been incorporated to manufacture general plumbing and gas fitting appliances; $30,000 capital stock; by T. Wooster, Fred Lang, Arnold F. Youngkman, C. V. Southard, F. W. Widmaier and Sigmond Sanger.

YOUNGSTOWN, O.—The city council has formally authorized the issue of $800,000 in bonds for the elimination of grade crossings.

YOUNGSTOWN, O.—Frank Lillie is soon to award contracts for the Palmyra road bridge, Fredericksburg bridge, and the Mill bridge; approximate cost will be $150,000.

YOUNGSTOWN, O.—The executive board of the Republic Iron & Steel Co. is said to favor the erection of rod and wire mills and possibly additional sheet mills when the 75 by-product coke ovens now under way are completed.

CLARKSBURG, W. VA. — Board of trade is negotiating with company wishing to locate a metal plant in this district.

MARTINSBURG, W. VA.—The name of the Martinsburg Power Co. will be changed to the Potomac Light & Power Co. The company has recently been placed in the hands of receivers. Permission has been given to increase the capital stock to $1,000,000 and add to the equipment of the plant.

WHEELING, W. VA. — Steam-Electric Engineering Co., has been incorporated, with a capital of $25,000 by F. J. Balleston, H. E. Newman, Frank E. Finnegan, E. E. Smith and H. M. Walmsley, all of Wheeling.

ASHLAND, KY.—Standard Planing Mill Co. has been incorporated; $20,000 capital stock; by Charles and J. H. Kitchen.

CARLISLE, KY.—Carlisle Electric Light

& Power Co. is planning the operation of an ice factory in connection with its present plant.

HARDIN, KY.—Hardin Light Co. is asking for prices on a Corliss engine, with a capacity of 15 to 20 horsepower; a second hand unit will be considered.

HARRODSBURG, KY.—Improvements may be made in the local water system; address the mayor.

HOPKINSVILLE, KY.—Ideal Motor Co. may be in the market shortly for machine tools for a large automobile repair shop which is being built.

HUSTONVILLE, KY.—Walter Owsley, who has purchased electric light equipment from the Hustonville Roller Mills, will purchase a 25-horsepower engine and other machinery.

LAWRENCEBURG, KY. — County judge can advise regarding the erection of a new jail to replace the structure recently burned.

LOUISVILLE, KY.—Louisville Bridge & Iron Co. is in the market for 25 alternating current motors, with a capacity of 350 horsepower.

LOUISVILLE, KY.—J. C. Oakes, major of United States engineers at Louisville, will receive bids until May 19 for a steel hull for the dredge Nolin river.

LOUISVILLE, KY.—The machine shop of the Economy Separate Switch Point Co. Thirtieth and High streets, was damaged by fire; W. M. Mitchell, president.

LOUISVILLE, KY.—National Board of Underwriters has recommended the installation at once of a 24,000,000-gallon pump at Crescent Hill station with a second of equal capacity within reasonable time.

LOUISVILLE, KY.—George H. Holzbog and others, who have been organizing the Louisville Steel & Iron Co. for some time, have about succeeded in the project, eastern capital having been interested. Sheet manufacturing equipment will be installed in the old plant of the Louisville Bolt & Iron Co.

MAYSVILLE, KY.—County will vote May 15 on a $200,000 bond issue for the construction and repair of roads and bridges.

MONTICELLO, KY.—A company is being organized to install a water works plant; C. C. Duncan, A. E. Shelton and others are interested.

NEW HAVEN, KY.—R. A. Greenwell is contemplating the purchase of equipment for the installation of an electric light plant.

OWINGSVILLE, KY. — Jeannette & Pointz Wheel & Hub Mfg. Co.'s plant at Salt Lick was badly damaged by fire.

PINEVILLE, KY.—Continental Coal Corporation will buy a second-hand, 50-horsepower, vertical, fire-tube boiler and two 150-horsepower return tubular boilers; address L. E. Yoder, chief engineer.

SHELBYVILLE, KY. — Kentucky Utilities Co., with offices in Lexington, Ky., will install a filter plant in connection with the local water system.

WAYLAND, KY.—Porter-Preston Coal Co., Paintsville, Ky., will install a mining plant about May 1 on a large coal tract which has just been leased.

BLOOMINGTON, IND.—Part of the equipment of the proposed $50,000 addition to be erected by the Nurre Mirror Plate Co. includes an electric crane.

COLUMBUS, IND. — Columbus Foundry Co., recently incorporated by Frank Phillips, William Summers, Walter Golden and others, is planning to begin operations at once.

COLUMBUS, IND. — Marshall E. Van-Arman, 624 State Life building, Indianapolis, has prepared plans for a $25,000 vocational school, two stories, which will require some manual training equipment.

CROWN POINT, IND. — Bids will be received until May 14 by Edward Simon, county auditor, for construction of a Strauss trunnion bascule bridge over the United States canal at 155th street, East Chicago, Ind.

EAST CHICAGO, IND.—Bids will be taken until May 7 for one centrifugal pump and foundations by T. Y. Richards, city clerk.

EAST GARY, IND.—Bids will be taken by Edward Simon, county auditor, Crown Point, Ind., until May 17 on a steel bridge consisting of three 53-foot pony spans over Deep river.

EVANSVILLE, IND.—Blount Plow Co. is to erect a $200,000 addition.

EVANSVILLE, IND.—William M. Smith heads a company being organized for the manufacture of a railroad safety device; the plant will cost $25,000.

FORT WAYNE, IND.—C. B. Weatherhogg, architect, 4 Hamilton Bank building is making plans for a $100,000, 5-story hospital.

GRABILL, IND. — Allen County Electric Light & Power Co. has been incorporated to supply current to Shirley City, Grabill, Harlan and other towns; $15,000 capital stock; by Alfred A. Pointer, Peter S. Amstutz, George H. Krudop, Julius Gehrig and Albert Egly.

INDIANAPOLIS. — Prest-O-Lite Co. is reported to be figuring on a shrapnel contract.

LOGANSPORT, IND.—Commissioners have ordered advertisements for bridges to be constructed in Adams, Boone, Noble and Eel townships.

MARTINSVILLE, IND.—Special Machinery & Foundry Co. has been incorporated; $50,000 capital stock; by Harry C. Bushmann, C. B. Williamson and C. G. Chase.

MUNCIE, IND.—Warner Gear Co., manufacturer of auto parts, A. C. Johnson, president, will take bids shortly on an addition to its plant of steel and reinforced concrete, two stories, 50 x 97 feet.

PRINCETON, IND.—Chicago & Eastern Illinois railroad is reported to be planning the establishment of shops to take the place of those at Evansville, Ind.

RICHMOND, IND.—The plant of the United Gas & Electric Co. of New York, will be purchased by the city, and added to the local plant. New equipment will be required.

SPENCER, IND.—G. A. Litt is taking bids for the Multiblade Razor Co. on a foundry, two stories and basement, 22 x 86 feet.

STINESVILLE, IND. — United Indiana Stone Co., George D. Thornton, vice president and general manager, Bloomington, Ind., will start work this spring on a $50,000 stone mill, 100 x 260 feet, in Stinesville.

CENTRALIA, ILL. — Electro-Pneumatic Skid Co. has been incorporated to manufacture machinery; $100,000 capital stock; by C. D. Claud, L. W. Wooley, J. W. Stansel and George Main.

CHICAGO. — Chicago, Burlington & Quincy has put out inquiries on a small list of machine tools.

CHICAGO.—Ottenheimer, Stern & Reichert, 105 West Monroe street, are drawing plans for a $250,000 club house for the Elks lodge, eight stories.

CHICAGO.—F. M. Barton, architect, is preparing plans for a 1-story factory building, 52 x 62 feet, for the Franklin Glass & Mirror Co., 312 May street.

CHICAGO.—Holabird & Roche, 104 South Michigan avenue, are making plans for John Burnham & Co., 110 South State street, for a $900,000, theatre building.

CHICAGO.—Marshall & Fox, 38 South Dearborn street, are preparing plans for Jones, Linick & Schaeffer, 110 South State street, for a theatre building to cost $600,000.

CHICAGO.—Clarke & Co., 125 North Canal street, have contracted for the erection of a 60 x 360-foot machinery warehouse at 2100

The Gist of the News

The Missouri, Oklahoma & Gulf railway is asking for the following equipment through the Arnold Co., Chicago: Five lathes, five grinders, three boring mills, two drills, two presses, a planer, a universal milling machine, a portable crane and hoist, a portable valve facing machine, portable valve setting rollers, a triple-head bolt cutter, a pipe-cutting and threading machine, a draw cut shaper, a bar shear, six portable vises, a 3,300-pound steam hammer, a forging machine and bulldozer, 2-inch bolt header and forging machine, a pressure blower, a case-hardening and spring furnace, a 500-pound belt-driven hammer, 12-foot bending rolls and a 12-foot flanging clamp.

Chesapeake & Ohio railroad is in the market for a planer and a vertical turret lathe.

Champion Lumber Co., Sunset, N. C., is in the market for six machine tools.

Warren Foundry & Machine Co., Easton, Pa., has put out a formal inquiry for 11 cranes.

Chicago, Burlington & Quincy railroad has put out inquiries for a small list of machine tools.

J. G. White, Exchange place, New York City, is taking bids on 11 machine tools, to be installed in the shops of the Dan Patch electric railways, Minneapolis.

Buffalo Forge Co., Buffalo, is working on plans for a 5-story, 125 x 200-foot addition to its erecting shop on Broadway and Tousey street.

Gurney Ball Bearing Co., Jamestown, N. Y., has appointed F. P. Seldon & Sons, 603 Industrial Trust building, Providence, R. I., to draw plans for its new plant.

Lead Hill Machine & Foundry Co., Springfield, Mo., is in the market for equipment for a plant about to be erected.

Pittsburgh Power Co., Elizabethtown, Tenn., has plans for a hydro-electric plant on the Chucky river, near Bremer, Tenn.

Waterloo, Cedar Rapids & Northern railroad will spend $300,000 during the next three months for equipment for its power plant in Waterloo, Ia. T. E. Rust, Waterloo, is chief engineer.

Two 25-ton electric traveling cranes will be installed in the proposed 60 x 360-foot machinery warehouse to be erected by Clark & Co., 125 North Canal street, Chicago.

& Northern railroad will spend $300,000 during the next three months for equipment for its power plant in Waterloo. T. E. Rust, Waterloo, is chief engineer.

DULUTH, MINN.—V. J. Price & Co., 608 Palladio building, architects, are preparing plans for the proposed $85,000 ice manufacturing plant of the Duluth Ice Co.; James Hart, president.

DULUTH, MINN. — Gowvan, Lenning Brown Co. are having plans prepared by F. G. German, 411 American Exchange building for a $300,000 warehouse, six stories, 160 x 260 feet.

SOUTHERN STATES

RICHMOND, VA.—Chesapeake & Ohio railroad is in the market for a planer and vertical turret lathe.

SUNBURST, N. C.—Champion Lumber Co. is in the market for six machine tools.

SAN ANTONIO, TEX.—Plans have been prepared far an addition to the Alamo Iron Works.

HARRISON, ARK.—Plans are being made for $100,000 water works system. Albert C. Moore, Joplin, Mo., is engineer.

BREMER, TENN. — Pittsburgh Power Co., Elizabethtown, Tenn., has plans for a hydro-electric plant on the Chucky river, near this point.

BUNTYN, TENN.—W. J. Norris is in the market for a gasoline engine, pump, dynamo, etc., for a domestic waterworks and lighting plant.

CENTERVILLE, TENN. — Centerville Ice Co. is being formed for the establishment of a plant; Nashville capital is interested.

CHATTANOOGA, TENN.—Standard Processing Co. has let a contract for erection of a $9,000 addition; mercerized cotton goods are manufactured.

CHATTANOOGA, TENN.—Armour & Co. are reported to have plans for the establishment of a large abattoir and cold storage plant in Chattanooga.

CHATTANOOGA, TENN. — Hooper Limestone Co. has purchased additional land and will increase the capacity of its stone-crushing plant. Some conveying machinery probably will be needed.

COLUMBIA, TENN.—An ice factory with a daily capacity of 30 tons, will be established by W. J. and J. F. Rushton, Birmingham, Ala.

HARRIMAN, TENN. — Harriman Hosiery Mills will install additional knitting machines, and probably will add also to the power equipment. The capitalization has been increased.

JELLICO, TENN.—Anderson county will issue $75,000 in bonds, for the erection of three bridges, one at Clinton, one at Moores Ferry and one at Edgemoore.

MASCOT, TENN.—American Zinc Co. of Tennessee, H. S. Kimball, president, has authorized the building of a $75,000 addition to its concentration mill.

MEMPHIS, TENN.—Lockwood & Co., 306 Madison avenue, will need machine tools for their automobile repair shop.

MEMPHIS, TENN. — Chera-Cola Bottling Co., for which a manufacturing building is being erected, will need power and special equipment, for which $25,000 is available.

MEMPHIS, TENN.—The city has voted to issue $1,500,000 bonds for the establishment of an electric light plant, though that of the Memphis Light & Power Co. may be bought; address the city commissioners.

MEMPHIS, TENN.—A plant will be established by the Southern Cotton Picker Co., which has been formed to manufacture a patented mechanical picker. The company is capitalized at $30,000 by George Pryor and others.

NEWPORT, TENN.—J. W. Kyker will purchase a gasoline engine for a hosiery mill which he is equipping; electric motors will be installed later.

SPRINGFIELD, TENN.—Bell-Dowlen Co. has been incorporated with $25,000 capital stock and will equip a flour mill and elevator.

OKLAHOMA, OKLA. — Croken-Hooten Machinery Co. has been incorporated; $6,000 capital stock; by A. K. Croken, W. L. Hutcheson and C. A. Hooten, Oklahoma City.

WESTERN STATES

OMAHA, NEB.—Hugh Murphy Contracting Co. has been incorporated; $60,000 capital stock; by Hugh, Richard and Hugh Jr, Murphy.

OMAHA, NEB.—Union Securities Co. has bought a site for a 10-story building for the First National bank. F. H. Davis is president, Thirteenth and Farnam streets.

GAYLORD, KAN. — Bonds amounting to $7,000 have been voted for a municipal electric light plant.

LAWRENCE, KAN.—H. Brocker, city clerk, is about to take bids on a $200,000 reinforced concrete bridge.

BUTTE, MONT.—Salt Lake financiers and mining men, represented by John S. Cowan and Bert Bernard, have purchased the controlling interest in the Golden Leafe property in Bannock from William Dunn. A mill will be erected and other improvements made. Mr. Dunn will remain as general manager.

COLUMBUS, MONT.—Contract for the construction of five bridges has been awarded by the county to the Security Bridge Co., Billings, Mont., at $12,376.

GREAT FALLS, MONT.—Contract for the construction of a steel bridge, consisting of two spans of 98 feet each, across the St. Mary river has been awarded by the U. S. Reclamation service to Minneapolis Bridge Co., Minneapolis.

LEWISTOWN, MONT.—Bids will be taken May 10 on metal flumes for the Winnett Irrigation Co., E. H. Holmboe, secretary.

RIVERTON, WYO. — Chicago & North-Western railroad is planning to erect a plant in Riverton to treat railroad ties, at a cost of $75,000.

DENVER, COLO.—Western Chemical Co. is planning to erect three buildings, two for acid manufacture and for ore roasting; estimated cost $200,000.

KELLOGG, IDA.—Flotation process will be added to the mill at the Highland Surprise mine, near Kellogg, at an estimated cost of $10,000.

ABERDEEN, WASH.—Aberden & Hoquiam Gas Corporation will ask for bids soon for the construction of a gas plant in Aberdeen. L. H. Burnett, president; Samuel Benn, vice president and W. W. Bonner, secretary.

OKANOGAN, WASH. — County and city authorities have agreed to the construction of a steel bridge to replace the present structure; J. W. Bowerman, Seattle, consulting engineer.

SEATTLE.—Contract for pumping plant for Lake Washington canal locks has been awarded to R. D. Wood & Co., Philadelphia, at $30,776.19.

SEATTLE.—J. A. McEachern, Seattle, was low bidder for construction of Eighth avenue South and Duwamish waterway bridge at $24,205.

SEATTLE.—Great Northern railroad has awarded a contract to Henry & McFee, White building, for construction of a $250,000, concrete and steel snow shed unit, 1,300 feet long, above Skykomish.

SEATTLE.—J. D. Ross, superintendent of lighting, recommends an addition to the Lake Union municipal steam plant, doubling its capacity and increasing its power load to 20,000 kilowatts.

SEATTLE. — McAteer Ship Building Co. has been awarded the contract for the construction of a 65-foot gasoline powered passenger and tow boat; it will be equipped with an 80-horsepower engine.

TACOMA, WASH.—Universal Tank Gage Co. has been incorporated to manufacture tank gages; $25,000 capital stock; J. C. Adams and H. Moore.

TACOMA, WASH.—County will receive bids until 11:00 p. m., May 8, for the construction of a bridge, No. 18196 A, across South Prairie creek; it will require a 145-foot frame trestle and a 60-foot steel span; certified check for 10 per cent required.

TACOMA, WASH. — The city has made arrangements with the Tacoma Central Heating Co. to furnish steam needed by auxiliary power plant in case of breakdown; Tacoma will be compelled to furnish its own generators, which will cost more than $50,000.

ASHLAND, ORE. — It is reported Smith Emery & Co., San Francisco, having the contract for the auxiliary water supply system in Ashland, will have plans completed soon, to include pipe line, pump house, settling tank, etc.

GRANTS PASS, ORE. — Twohy Bros., railroad contractors, Portland, Ore., announce the completion of the California & Coast railroad from Grants Pass to Crescent City, Cal., has been financed and construction is to be started shortly. The first 10 miles of the road from Grants Pass to Wilderville have been constructed by this city, leaving 81 miles to be built.

LINNTON, ORE.—O. M. Clark, Richard Shepard and J. B. Holbrook have made an application to the county commissioner for a franchise for an electric line to take the place of the road abandoned by the United railroads; estimated cost is $100,000.

PORTLAND, ORE.—Portland Railway Light & Power Co. plans a railroad through and beyond Sandy for a distance of 18 miles with a view of opening a large body of timber.

PORTLAND, ORE.—Public docks commission will call an election in June to submit a $900,000 bond issue for erecting a grain elevator.

PORTLAND, ORE.—Lister Sash Weight Co. has been incorporated to manufacture sash weights; $25,000 capital stock; W. W. Ferguson, H. J. Cress, E. D. Timms and O. W. Olson.

PORTLAND, ORE.—Electric Power Switch Control Co. has been incorporated to manufacture a new type of electric switch; $15,000 capital stock; by Benjamin Erickson, Samuel McConnell and Daniel Leatherman. A plant is to be erected at once.

STANFIELD, ORE.—Motor Wind Mill Co. has obtained a site and will build a factory.

EAST SAN DIEGO, CAL.—Citizens will vote May 7 on issuing $70,000 bonds to buy the local water works, $41,000 being destined to buy the plant and $29,000 for improvements.

MARTINEZ, CAL. — Supervisors have obtained plans for a $120,000, 542 foot bridge over Middle river.

NEEDLES, CAL.—J. A. Sourwine, county surveyor of San Bernardino county, says plans are being drawn for a bridge over the Colorado river at Topock, Arizona, near Needles. Main span will be a three-hinged, steel arch, 592 feet long, with a plate girder approach, 120 feet long, at each end; estimated cost $85,000.

SAN FRANCISCO. — Supervisors have appropriated $5,000 for plans for a bascule bridge at Fourth street. The bill authorizing a contract has been passed.

VISALIA, CAL.—Mt. Whitney Power & Electric Co. has been given permission by the state railway commission to issue $238,000 in bonds for improvements. Fred J. Hamilton is superintendent.

South Kilbourn avenue, on a 4-acre tract recently bought. Two 25-ton electric traveling cranes will be installed.

CHICAGO.—General contract has been let to W. A. Pillinger Co. 64 West Randolph street, for R. F. Conway Co., 1931 Wendell street, for a small steel plant.

CHICAGO.—Western Pump Supply Co., 119 North Desplaines street, has bought property on Fillmore street near Kedzie street on which a $60,000, 3-story warehouse is to be erected.

CHICAGO.—E. H. Stroud & Co., 52 West Kinzie street, manufacturers of machinery, have plans for a 2-story factory, 26 x 65 feet, at 928 Fullerton avenue.

CHICAGO.—Al-Cool Fan Co. has been incorporated to manufacture and deal in mechanical devices; $5,000 capital stock; by H. E. Selve, Robert Bachrach and S. Sidney Stein.

CHICAGO.—Solar Metal Products Co., Henry Gogay, president, 2502 South Paulina street, will build three buildings of steel and concrete, 100 x 230 feet, 50 x 120 feet and 50 x 60 feet.

CHICAGO.—Motor Equipment Co. has been incorporated to manufacture automobile supplies and accessories; $30,000 capital stock; by Herbert M. Lautmann, J. W. Leonard and I. Karl Davidson, 30 North La Salle street.

CHICAGO.—George W. Johnson Column Form Co. has been incorporated to manufacture patented sheet metal forms for reinforced concrete columns; $2,500 capital stock; by Geo. W. Johnson, John F. Jurgenson and James R. Glass, 1224 Lunt avenue.

CLEARING, ILL.—Chicago Compressed Gas Co. has increased its capital stock from $25,000 to $50,000.

MORTON, ILL.—Kramer Rotary Harrow Co. has been incorporated to manufacture rotary harrows; $50,000 capital stock; Leonard Hillis, M. B. Kennedy and A. S. Gibson.

SPRINGFIELD, ILL.—Bids will be received until May 17 by Martin C. Schwab, consulting engineer, 1514 Mallers building, Chicago, for an engine, stacks and accessories at the Elgin State Hospital at Elgin and similar equipment for the Chicago State hospital for the insane at Dunning.

STRONGHURST, ILL. — M. F. T. Schierbaum, owner of the electric light plant, is about to add to its equipment, including a 65-horsepower, Muenzel gas engine, a 75-horsepower Muenzel gas producer and a 45-kilowatt, 67-cycle, 3-phase, 2,300-volt generator.

STRONGHURST, ILL.—Bids will be received until May 7 by Foster Lazer, village clerk, for a deep well pump to deliver 100 gallons per minute from 100 feet below ground to a tank 110 feet above ground and a gas engine or oil engine.

ANN ARBOR, MICH.—Hoover Steel Ball Co. is building a 60 x 256-foot addition to its plant, D. F. Zimmerman is general manager.

BATTLE CREEK, MICH.—American Steel Adjustable Screen Co. has been incorporated to manufacture screen doors; $50,000 capital stock; by W. E. Hubbard, Arthur Walker, R. G. Rock will build and equip a plant.

DETROIT.—Boss Tractor Mfg. Co. has been incorporated; $25,000 capital stock; by Byron F. Everett, Edwin R. Evans and Philip S. Beamer.

DETROIT.—Automatic Balanced Valve Co. has been incorporated; $100,000 capital stock; by Clarence Blakely, Frank T. Lodge and William Ralston Brown.

DETROIT.—Keystone Brass Mfg. Co. has been incorporated; $20,000 capital stock; by Michael H. Green, George G. Leonard and Clifton P. Weil.

DETROIT. — Detroit Pneumatic Chuck Co., manufacturer, has been incorporated; $30,000 capital stock; by George W. Morrison, Fee M. White and Edward A. Harding.

DETROIT.—Albert Kahn & Ernest Wilby, 60 Lafayette avenue, have plans ready for a $500,000 auto factory, four stories, 100 x 470 feet, and a service building, four stories, 100 x 243 feet, both for the Ford Motor Co.

DETROIT. — Universal Electric Co. has been incorporated to manufacture vacuum cleaners, washing machines, etc.; $15,000 capital stock; by L. E. Jolls, W. W. McIntyre, and A. C. Ulp.

GRAND RAPIDS, MICH.—Sanitary Slicing Machine Co. has increased its capital stock from $5,000 to $20,000.

GRAND RAPIDS, MICH.—National Brass Co. has increased its capital stock from $90,000 to $200,000.

MUSKEGON, MICH.—James Bradley, Pittsburgh, and associates have let the contract to C. O. Jensen for the erection of a $12,000, brick and concrete foundry and machine shop for the manufacture of cast iron plumbing and steam goods; about 25 men will be employed at the start. The company has not been incorporated.

YPSILANTI, MICH. — Edison Illuminating Co. has awarded a contract for an electric sub-station after plans drawn by H. B. Gunnison Co., architects, David Whitney building, of brick with steel frame, 56 x 67 feet, and 38 feet high.

CHILTON, WIS. — Steinert Mfg. Co., manufacturer of gasoline engines, has outgrown its plant and has bought a factory building at Plymouth, Wis., where it will move shortly.

DODGEVILLE, WIS. — Dodgeville Motor Car Co. is remodeling the former Crasen machine and blacksmith shop into a garage and repair shop with power-driven tool equipment. The machine shop will be in charge of Fred Hollister.

ELKHART LAKE, WIS. — Elkhart Lake Light & Power Co., capital stock $10,000, has been incorporated by Gustave and George Brickbauer and William H. Burk.

KENOSHA, WIS.—Simmons Mfg. Co., brass and iron beds, springs, etc., has broken ground for a large factory addition and will spend $250,000 in otherwise improving and re-equipping its plant for the utilization of a new method of bed manufacture consisting of seamless drawn steel tubing and electric welding.

KENOSHA, WIS.—Kenosha common council will sell its present municipal waterworks pumping station to the Simmons Mfg. Co., for $25,000 in cash and seven acres of land on Lake Michigan, and is about to award contracts for the previously contemplated new station and intake. From 8,000 to 10,000 lineal feet of 48-inch, cast iron pipe will be required for the intake and shore tunnels.

LAKE GENEVA, WIS.—Clarence A. Anderson is establishing a small machine shop for general machinery repairs and sheet metal work.

MADISON, WIS.—Madison Gas & Electric Co. has plans in progress by Claude & Starck, architects, Badger annex, for a power house addition, 44 x 44 feet.

MADISON, WIS.—S. H. Dunford, Moores & Dunford, architects, 10 South La Salle street, Chicago, will take bids about May 10 for $110,000 warehouse and cold storage building, seven stories, 95 x 157 feet.

DWIGHT, MO.—Dwight Elevator Co. has been incorporated; $10,000 capital stock; by J. R. Oughton, Frank L. Smith, C. J. Ahren.

JOPLIN, MO.—F. Taylor Snapp, chairman of the building committee, is considering plans for a $150,000 Scottish Rite cathedral, 125 x 150 feet.

JOPLIN, MO.—Joplin Ore & Spelter Co. has been incorporated; $100,000 capital stock; by N. E. Walker, George W. Means and R. O. Robinson.

KANSAS CITY, MO.—Chicago, Burlington & Quincy railroad has submitted plans to Colonel Herbert Deckyne, government engineer, for a bridge over the Missouri river to replace the structure known as the Hannibal bridge, C. H. Cartlidge, Chicago, is bridge engineer.

KANSAS CITY, MO.—Board of education has plans for a $155,000 high school addition, 48 x 115 feet.

KANSAS CITY, MO.—Kansas City Stock Yards Co. is planning to spend $2,500,000 on extensions and improvements at its yards.

KANSAS CITY.—F. C. Gunn, 1107 Republic building, is taking bids for the Burdett Mfg. Co. on a factory 2½ stories, 140 x 140 feet.

KANSAS CITY, MO.—Alton Grain Elevator Co. has been incorporated; $105,500 capital stock; by E. D. Fisher, E. F. Swinney, W. M. Corbett.

KANSAS CITY, MO.—American Printing Machinery Co. has been incorporated; $2,000 capital stock; by George R. Strunk, Fred C. Andrews and G. W. Duvall.

KANSAS CITY, MO.—Mid-continent Exposition Club is having plans prepared for a club house, exposition building and a two-mile, creosoted block automobile track. Club offices are at 407 Republic building.

KANSAS CITY, MO.—E. H. L. Thompson, Republic building, and associates, are planning to erect a 6-story interurban railway station, 125 x 225 feet, to cost about $1,000,000. Walls will be steel and reinforced concrete and floors of concrete. S. B. Tarbert, Republic building, is architect.

NORMANDY, MO.—Barnett, Hanyes & Barnett, Century building, St. Louis, have made plans for a boiler house, 70 x 100 feet, of reinforced concrete and steel for the Daughters of Charity of St. Vincent of this city.

SPRINGFIELD, MO.—Lead Hill Machinery & Foundry Co. is seeking equipment for a plant about to be erected.

ST. JOSEPH, MO.—The city is planning to erect a $250,000 concrete and steel viaduct. Elliott Marshall is mayor.

ST. JOSEPH, MO. — Heyward Vrooman, 1101 Commerce building, is taking bids on a $350,000, 12-story hotel, 105 x 140 feet.

ST. JOSEPH, MO.—Viscosity Refining Co. is taking bids on a steel refining plant. Adelbert Simmons, 1714 South Fourth street, may be communicated with.

ST. JOSEPH, MO. — Missouri-Kansas Tank Co. is about to erect a plant here for the manufacture of steel tanks, grain bins and silos.

ST. JOSEPH, MO. — Jameson Machinery Co., 213 North Twenty-second street, is taking bids through Eckel & Aldrich, 1,104 Corby-Forsee building, on an addition to its machine shop, 30 x 40 feet, two stories, to cost $6,000.

ST. LOUIS.—American Shoe Machinery & Tool Co. has increased its capital stock from $20,000 to $30,000.

ST. LOUIS.—Hil-Ko Rim Lock Co., Railway Exchange buildings, is to establish a plant for the manufacture of a rim lock for automobiles. Frank D. Hiller, president.

ST. LOUIS.—Continental Furnace Efficiency Co. has been incorporated to manufacture furnace specialties; $15,000 capital stock; H. B. Kerruish, M. L. Jennings and William C. Hay.

LINN GROVE, IA. — C. A. Fulton, city clerk, is seeking plans for a water works system, the contract for which will be let in June, at a cost of about $9,000, including 6,000 feet of 2 to 6-inch mains, a well and pumping station.

MAQUOKETA, IA.—Iowa Auto & Garage Co. is about to build a welding plant at its garage.

WATERLOO, IA.—Waterloo, Cedar Rapids

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery to July 1.)

Bessemer, valley	$13.60
Bessemer, Pittsburgh	14.55
Basic, Pittsburgh	13.45
Basic, eastern Pa.	13.25
Malleable, Pittsburgh	13.45 to 13.95
Malleable foundry, Chicago	13.00
Malleable foundry, Philadelphia	15.00 to 15.25
Malleable foundry, Buffalo	12.50 to 13.00
No. 1X foundry, Philadelphia	14.54 to 14.79
No. 2 foundry, Pittsburgh	13.45 to 13.95
No. 2 foundry, valley	12.50 to 13.00
No. 2 foundry, Cleveland	13.25
No. 2 foundry, Ironton	12.75 to 13.00
No. 2 foundry, Chicago	13.00
No. 2X foundry, Philadelphia	14.29 to 14.54
No. 2X fdy., N. J. tidewater	14.25 to 14.50
No. 2X foundry, Buffalo	12.50 to 13.00
No. 2 plain, Philadelphia	14.00 to 14.25
No. 2 plain, N. J. tidewater	14.00 to 14.25
No. 2 plain, Buffalo	12.25 to 12.50
No. 2 southern, Birmingham	9.50 to 9.75
No. 2 southern, Cincinnati	12.15 to 12.65
No. 2 southern, Chicago	13.50
No. 2 southern, Phila. delivery	13.75 to 14.00
No. 2 southern, Cleveland	13.50
No. 2 south'n, New York docks	13.50 to 13.75
No. 2 southern Boston, docks	13.50 to 13.75
No. 2 south. interior, New Eng.	14.25 to 15.25
No. 2 southern, St. Louis	12.90 to 13.40
Virginia No. 2X furnace	12.50
Virginia 2X, Philadelphia	15.25
Virginia 2X, Jersey City	15.50
Virginia 2X, Boston points	15.75
Gray forge, eastern Pa.	13.25 to 13.50
Gray forge, Pittsburgh	13.20
Gray forge, Birmingham	8.75 to 9.00
Silveries, 8 per cent, Jackson, O.	14.75 to 15.25
Silveries, 5 per cent Birmingham	12.50
Silveries, 5 per cent, Chicago	16.35
Standard low phos., Phil.	19.00 to 20.00
Lebanon low phos., furnace	16.00 to 16.50
Low phos., Pittsburgh	20.95 to 21.20
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	15.75 to 16.50
Charcoal, Buffalo	15.75 to 17.00
Charcoal, Birmingham	25.00

IRON ORE

(Lower lake ports.)

Old range Bessemer, 55 per cent	$3.75
Mesabi Bessemer, 55 per cent	3.50
Old range, non-Bess., 51½ per cent	3.00
Mesabi non-Bessemer, 51½ per cent	2.85

(Per unit Philadelphia.)

(Prices nominal.)

Foreign Bess., 50 to 65 per cent.	7½c to 8½c
For'n non-Bes., 50 to 65 per cent	7½c to 8½c

COKE

(At the ovens)

Connellsville furnace	$1.55 to 1.60
Connellsville fur. contr.	1.65 to 1.75
Connellsville foundry	2.00 to 2.40
Connellsville fdy. contr.	2.25 to 2.50
Wise county furnace	1.75 to 2.00
Wise county foundry	2.10 to 2.40
Pocahontas furnace	1.75 to 2.00
Pocahontas foundry	2.00 to 2.25
New River, foundry	2.50 to 3.00
New River, furnace	2.00 to 2.25

FERRO-ALLOYS

Ferro-mang., Balti. (prompt)	$90.00 to 100
Ferro-mang. (future), Balti	78.00
Ferro-silicon, 50 per cent, Pbgh.	71.00 to 73.00
Ferro-silicon, 50 per cent, Phila.	71.00 to 73.00
Ferro-sil., 12 to 13 per cent	18.00 to 18.50
Ferro-sil., 11 to 12 per cent	17.00
Ferro-sil., 10 to 11 per cent	16.00
Ferro-sil., 9 to 10 per cent	15.00

(Ferro-silicon quoted at furnace Ashland, Jackson and New Straitsville)

Ferro-carbon titanium, carloads, per lb.	8c to 12½c

SEMI-FINISHED STEEL

Open hearth billets, Phila.	$22.06 to 22.56
Forging billets, Phila.	25.06 to 25.56
Forging billets, Pbgh.	24.00 to 24.50

Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama canal, per 100 lbs., in carload lots, exclusive of insurance and dockage.

From New York	$0.45
From Pittsburgh	.619
From Youngstown	.639
From Niles	.619
From Wheeling	.619
From Steubenville	.619
From Johnstown	.604
From Coatesville	.545
From Steelton	.555
From Bethlehem	.529
From Cleveland	.65
From Chicago	.765

Rates on sheet mill products $2 per ton higher.

Wire rods, Pittsburgh	$25.00 to 26.00
Billets, Pittsburgh	19.50 to 20.50
Billets, Youngstown	18.50 to 19.50
Sheet bars, Pittsburgh	20.00 to 21.00
Sheet bars, Youngstown	19.00 to 20.00
Muck bar, Pittsburgh	27.00

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh.	1.25c
Stand. open-hearth rails, Pbgh.	1.34c
Lgt. rails, 8-lbs., Pbgh. & Chgo.	1.22c
Lgt. rails, 12 lbs., Pbg. & Chgo.	1.17c
Lgt. rails, 16 to 20 lbs., Pgh. & Chgo.	1.12c
Lgt. rails, 25 to 45 lbs., Pbgh. and Chgo.	1.07c
Relaying rails, standard, Pbgh. & Chgo.	$23.00 to 24.00
Relaying rails, light, Chicago	21.50 to 22.50
Angle bars, st. sect, Pbgh. base.	1.50c
Angle bars, st. sections, Chicago	1.50c
Spikes, railroad, Pbgh.	1.35c to 1.40c
Spikes, railroad, Chgo.	1.50c
Track bolts, Pbgh.	1.85c to 1.90c
Track bolts, Chgo.	2.00c

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	3.00
New England	3.00
Philadelphia	2.79
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.00 to 1.50
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York (rail and water)	4.25
Philadelphia (all rail)	5.20
Philadelphia (rail and water)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago, to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.47
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	1.20c
Structural shapes, Chicago	1.34c to 1.39c
Structural shapes, Philadelphia	1.359c
Structural shapes, New York	1.369c
Struc. shapes, San Francisco	2.00c to 2.05c
Tank plates, Chicago	1.29c to 1.39c
Tank plates, Pittsburgh	1.10c to 1.20c
Tank plates, Philadelphia	1.359c
Tank plates, New York	1.369c
Bars, soft steel, Pittsburgh	1.20c
Bars, soft steel, Chicago	1.39c
Bars, soft steel, Philadelphia	1.359c
Bars, soft steel, New York	1.369c
Hoops, carloads, Pittsburgh	1.25c to 1.30c
Bands, Pittsburgh	1.20c
Shafting, Pbgh., carloads. 68 to 70 per cent off	
Bar iron, Chicago	1.15c
Bar iron, Philadelphia	1.175c to 1.225c
Bar iron, New York	1.125c
Bar iron, Cleveland	1.20c to 1.25c
Bar iron, Pittsburgh	1.20c to 1.25c
Hard steel bars, Chicago	1.20c to 1.25c
Smooth finish, mchy. steel, Chi.	1.68c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	1.80c to 1.90c
No. 28, black, Chicago	1.94c to 1.99c
No. 28, tin mill, black, Pbgh.	1.85c to 1.90c
No. 28, galvanized, Pbgh.	3.30c to 3.40c
No. 28, galvanized, Chgo.	3.59c
No. 10, blue, annealed, Pbgh.	1.30c to 1.35c
No. 10, blue, annealed, Phila.	1.459c to 1.509c
Tin plate, 100 lb., coke base	3.20c to 3.35c

EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

Single pickled, cold roll, and re-anl.	30 cents
Hot roll'd pickl'd and anl., tin mill	25 cents
Full pickl'd, cold rolled and re-anl.	50 cents
Auto sheets	75 cents
Blued stove pipe stock	10 cents
Range steel	30 cents
Re-squaring	10 cents
Roller leveling	10 cents
Patent leveling and re-squaring	35 cents
Oiling sheets	10 cents
Deoxidizing	10 cents
Lime finish	10 cents
Open-hearth stamping steel, free from mill scale	55 cents
Special open hearth deep stpg. steel free from mill scale	80 cents
Extra deep special auto body stock	$1.25
Ext. for 28 gage ov. 32 to 36-in. wide	10 cents

No reduction for sheets not annealed.

The above extras apply on both sheet and tin mill specifications, at the same rate.

IRON AND STEEL PIPE

(Pittsburgh.)

	Black. Butt-weld.	Galv. Butt-weld.
Steel, ¼ to 3 inches	80	69½
Iron, ¼ to 2½ inches	70	59
	Lap-weld.	
Steel, 2½ to 6 inches	79	68½

BOILER TUBES

Steel, 3½ to 4½ inches l. c. l.	75
Iron, 3½ to 4½ inches l. c. l.	63

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotation.)

Wire nails, jobbers, Pittsburgh	$1.55 to 1.60
Plain wire, jobbers, Pittsburgh	1.35 to 1.40
Galvanized wire, jobbers, Pbgh.	1.85 to 1.90
Polished staples, Pbgh.	1.55 to 1.60
Galvanized staples, Pbgh.	2.05 to 2.10
Barb wire, painted, jobbers, Pbgh.	1.55 to 1.60
Barb wire, galv., jobbers, Pbgh.	2.05 to 2.10

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled threads, 80 and 15; cut threads 80 and 10; larger or longer, 75 and 17½.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter, rolled 80 and 20; cut, 80 and 15; larger or longer, 80.

Gimlet and cone point lag or coach screws, 85 and 2½.

Hot pressed square, blank or tapped nuts. $6.40 off list; hot pressed hexagon blank or tapped, $7.30 off.

Cold pressed, square, blank or tapped, $6.10 off; hexagon, blank or tapped, ⅜ inch and larger, $7.50; ⅞-inch and smaller, $8.00.

RIVETS

Structural rivets, Pbgh	1.45c to 1.50c
Structural rivets, Chgo	1.68c
Boiler rivets, Pbgh	1.55c to 1.60c
Boiler rivets, Chgo	1.78c

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	1.55c to 1.60c

COLD ROLLED STRIP STEEL

(Subject to regular extras.)

0.10 to 0.19 Carbon.	Base price Cut to length	
1½ inch and wider	Hard.	Soft.
0.100 and thicker	2.85	3.10
0.050 to 0.099 inc.	2.95	3.20
0.035 to 0.049 inc.	3.10	3.35
0.031 to 0.034 inc.	3.35	3.75
0.025 to 0.030 inc.	3.60	4.00
0.020 to 0.024 inc.	3.80	4.20
0.017 to 0.019 inc.	4.70	5.20
0.015 and 0.016	5.10	5.60
0.013 and 0.014	5.95	6.45
0.012	6.55	7.05
0.011	6.90	7.40
0.010	7.25	7.75
	Coils.	
0.100 and thicker	2.75	3.00
0.050 to 0.099 inc.	2.80	3.05
0.035 to 0.049 inc.	2.95	3.20
0.031 to 0.034 inc.	3.10	3.50
0.025 to 0.030 inc.	3.20	3.60
0.020 to 0.024 inc.	3.30	3.70
0.017 to 0.019 inc.	3.60	4.10
0.015 and 0.016	4.00	4.50
0.013 and 0.014	4.70	5.20
0.012	5.05	5.55
0.011	5.40	5.90
0.010	5.75	6.25

CAST IRON WATER PIPE

Six to 48-in., Cleveland	23.75
Four-inch, Chicago	26.00
Six to 12 inches, Chicago	24.00
Large sizes, Chgo	23.00
Six-inch, New York	20.50 to 21.50
Four-inch, New York	21.50 to 22.50
Four-inch, Birmingham	19.50
Six-inch and larger, Birmingham	19.50

Gas pipe, $1 per ton higher than water.

WAREHOUSE PRICES

Steel bars, Chicago	1.65c
Steel bars, Cleveland	1.80c
Steel bars, Cincinnati	1.75c to 1.80c
Steel bars, Philadelphia	1.60c to 1.65c
Steel bars, New York	1.80c
Steel bars, St. Louis	1.70c
Iron bars, Chicago	1.65c
Iron bars, Cleveland	1.75c
Iron bars, St. Louis	1.65c
Iron bars, Cincinnati	1.70c to 1.80c
Iron bars, Philadelphia	1.55c to 1.60c
Iron bars, New York	1.65c to 1.70c
Hoops, Chicago	2.15c
Shapes and plates, Chicago	1.75c
Shapes and plates, Cleveland	1.90c
Shapes and plates, Cincinnati	1.85c to 1.90c
Shapes and plates, St. Louis	1.80c
Shapes and plates, Philadelphia	1.60c to 1.65c
Shapes and plates, New York	1.85c
No. 10 blue anl. sheets, Chgo	1.95c
No. 10 blue anl. sheets, Cleve	2.05c
No. 10 blue anl. sh. St. Louis	2.00c
No. 10 blue anl. sheets, Cinci	2.00c
No. 28 black sheets, Chgo	2.55c
No. 28 black sheets, Cleveland	2.45c
No. 28 black sheets, Cincinnati	2.45c to 2.55c
No. 28 black sheets, St. Louis	2.55c
No. 28 galv. sheets, Chgo	3.75c
No. 28 galv. sheets, Cleveland	3.50c
No. 28 galv. sheets, Cincinnati	3.40c to 3.55c
No. 28 galv. sheets, St. Louis	3.75c

Freight Rates, Coke

Connellsville regions, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.70
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

No. 1 railroad wrought, Chgo	$ 8.50 to 9.00
No. 1 railroad wrought, Cleve	9.75 to 10.00
No. 1 railroad wrought, St. L	8.00 to 8.50
No. 1 railroad wrought, Cincin	7.50 to 8.00
No. 2 railroad wrought, Chgo	8.25 to 8.50
No. 2 railroad wrought, St. L	7.50 to 7.75
Arch bars and transoms, Chgo	11.50 to 12.00
Arch bars and transoms, St. L	11.00 to 11.50
Knuckles, coup. & spr'gs, Chgo	8.75 to 9.00
Knuckles, coup. & spr'gs, St. L	8.25 to 8.50
Shafting, Chicago	11.25 to 11.75
Shafting, St. Louis	11.00 to 11.50
Steel car axles, Chicago	10.50 to 11.00
Steel car axles, St. Louis	10.00 to 10.50
Locomotive tires, Chicago	8.50 to 9.00
Locomotive tires, St. Louis	9.00 to 9.25
Cut forge, Chicago	8.25 to 8.75
Pipes and flues, Chicago	6.25 to 6.75
Pipes and flues, Cleveland	7.25 to 7.50

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—	
New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Minneapolis and St. Paul	32.9 cents
Denver	68.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast, (all rail)	80 cents
Pacific coast, via Panama canal	61.9 cents

Pipes and flues, St. Louis	6.00 to 6.50
No. 1 cast, Chicago	9.00 to 9.25
No. 1 cast, Cleveland	10.00 to 10.50
No. 1 cast, Cincinnati	8.50 to 9.00
No. 1 cast, St. Louis	9.00 to 9.25
No. 1 busheling, Chicago	7.25 to 7.75
No. 1 busheling, Cleveland	8.25 to 8.50
No. 1 busheling, Cincinnati	6.00 to 6.50
No. 1 busheling, St. Louis	7.00 to 7.25
No. 2 busheling, Chicago	6.00 to 6.50
No. 1 boiler plate, cut, Chgo	5.50 to 5.75
No. 1 boiler plate, cut, St. L	5.50 to 5.75
Boiler punchings, Chicago	8.25 to 8.75
Cast borings, Chicago	5.25 to 5.50
Cast borings, Cleveland	6.00 to 6.25
Cast borings, Cincinnati	4.75 to 5.25
Cast borings, St. Louis	4.75 to 5.25
Machine shop turnings, Chicago	5.00 to 5.50
Machine shop turnings, Cleve	5.75 to 6.00
Machine shop turnings, Cinci	$ 4.25 to 4.75
Machine shop turnings, St. L	5.25 to 5.75
Malleable agl., Chicago	7.50 to 7.75
Malleable agricultural, St. Louis	6.00 to 6.50
Malleable, railroad, Chicago	7.75 to 8.25
Malleable, railroad, Cincinnati	6.00 to 6.50
Malleable, railroad, St. Louis	6.50 to 7.00
Angle bars, iron, Chicago	11.25 to 11.75
Angle bars, iron, St. Louis	9.50 to 10.00
Angle bars, steel, Chicago	8.25 to 8.50
Angle bars, steel, St. Louis	8.00 to 8.25
Stove plate, Chicago	7.75 to 8.00
Stove plate, Cleveland	8.00 to 8.50
Stove plate, Buffalo	8.25 to 8.75
Stove plate, Cincinnati	6.00 to 6.50
Stove plate, St. Louis	6.50 to 6.75
Bundled sheet, Cincinnati	4.75 to 5.25

(Gross tons.)

Heavy melting steel, Pbgh	$11.75 to 12.00
Heavy melting steel, Buffalo	10.25 to 10.75
Heavy melting steel, Chgo	9.25 to 9.50
Heavy melting steel, Cleveland	10.25 to 10.50
Heavy melting steel, Cincinnati	8.50 to 9.00
Heavy melting steel, eastern Pa.	11.00 to 11.50
Heavy melting steel, New York	8.75 to 9.00
Heavy melting steel, St. Louis	9.50 to 10.00
Bundled sheet, Buffalo	7.00 to 7.50
Grate bars, Buffalo	9.00 to 9.50
Grate bars, New York	6.50 to 7.00
No. 1 railroad wrought, east. Pa.	12.50 to 13.00
No. 1 railroad wrought, Pbgh	10.25
No. 1 R. R. wght., New York	10.50 to 11.00
No. 1 R. R. wrought, Buffalo	10.00 to 10.50
Shafting, New York	12.50 to 13.00
Shafting, eastern Pa	15.00 to 15.50
Wrought pipe, New York	8.00 to 8.25
Wrought pipe, eastern Pa	10.25 to 10.50
Mch. shop turnings, New York	6.00 to 6.25
Machine shop turnings, Buffalo	5.50 to 6.00
Mch. shop turnings, Pbgh	7.75 to 8.00
Mch. shop turnings, eastern Pa.	8.00 to 8.50
Cast borings, New York	5.75 to 6.00
Cast borings, eastern Pa	8.00 to 8.50
Cast borings, Buffalo	6.00 to 6.50
Cast borings, Pittsburgh	8.25 to 8.50
Stove plate, N. J. points	8.50 to 9.00
Stove plate, Pittsburgh	8.25 to 8.75
Stove plate, eastern Pa	9.00 to 9.50
Shoveling steel, Chicago	8.75 to 9.50
Shoveling steel, St. Louis	8.00 to 8.50
Reroll'g rails, 5 ft. & ov., Pbgh.	12.00 to 12.50
Reroll. rails, 5 ft. & ov., Chgo.	10.00 to 10.25
Reroll. rails, 5 ft. & ov., Cleve.	11.00 to 11.50
Reroll. rails, 5 ft. & ov., E. Pa.	11.50 to 12.00
Reroll, rails, 5 ft. & ov., St. L.	9.25 to 9.75
Steel rails, short, Chicago	10.00 to 10.50
Steel rails, short, Cleveland	11.00 to 11.50
Steel rails, short, St. Louis	9.25 to 9.50
Iron rails, Cleveland nom.	11.75 to 12.00
Iron rails, Chgo	11.75 to 12.00
Iron rails, Cincinnati	10.25 to 10.75
Iron rails, eastern Pa	13.50 to 14.00
Iron rails, St. Louis	10.00 to 10.50
Iron rails, Pittsburgh	12.50 to 13.00
Frogs, switches, guards, Chgo	9.25 to 9.50
Frogs, switches & g'rds, St. L.	9.25 to 9.50
Car wheels, (iron), Pittsburgh	11.00 to 11.50
Car wheels, (steel), Pittsburgh	11.50
Car wheels, Chicago	9.75 to 10.00
Car wheels, eastern Pa	10.75 to 11.25
Car wheels, Buffalo	10.00 to 10.50
Car wheels, N. J. points	9.00 to 9.25
Car wheels, St. Louis	10.00 to 10.25
Iron axles, Pittsburgh	17.50
Iron axles, Cincinnati	19.00 to 20.00
Iron axles, eastern Pa	18.50 to 19.00
Iron axles, Buffalo	16.00 to 16.50
Iron axles, Chicago	15.75 to 16.00
Steel car axles, New York	11.50 to 12.00
Steel car axles, Buffalo	12.00 to 12.50
Steel car axles, Cleveland	12.00 to 12.50
Steel car axles, eastern Pa	14.00 to 14.50
No. 1 busheling, Buffalo	7.50 to 8.00
No. 1 busheling, Pittsburgh	9.75 to 10.00
No. 2 busheling, Buffalo	5.25 to 5.75
Low phosphorus steel, Buffalo	12.50 to 13.00
Low phosphorus steel, Pbgh	13.75 to 14.00
Low phos. steel, eastern Pa	14.00 to 14.50
No. 1 forge, eastern Pa	8.50 to 9.00
No. 1 cast, eastern Pa	12.00 to 12.50
No. 1 cast, Pittsburgh	11.75 to 12.00
No. 1 heavy cast N. J. points	11.25 to 11.50
Mall. iron, R. R., Cleveland	10.25 to 10.50
Malleable railroad, Pittsburgh	10.00
Malleable R. R., Buffalo	9.50 to 10.00
Malleable, R. R., east Pa	8.50 to 9.00
Bundled sheet, Pittsburgh	9.00 to 9.25
Bundled sheet, Cleveland (nom.)	7.75 to 8.25

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HAMILTON, OHIO

Electric Smelting of Ferro-Silicon

(*Continued from page* 867)

silicon is packed in barrels that are both water and gas tight. Some English railroads require that each package must have three 1-inch holes to permit the escape of gases. For safe transportation uniform regulations should be enforced by all countries.

The cost of manufacture of ferro-silicon depends more upon the price of electric power than upon any other item. This is because of the large amount of power necessary and the low cost of the raw materials composing the charge. Consequently a large part of the electric-furnace ferro-silicon used in the United States is imported from Europe and Canada. Of plants engaged in the manufacture of ferro-silicon the writer found none in which the power cost was over $20 per kilowatt-year and the average was about $13 per kilowatt-year.

An estimate of the cost of production of 50 per cent ferro-silicon is given in Table II. The calculations are on the basis of two 2,000-kilowatt furnaces, one operating and the other kept in reserve. The Norwegian plant is within 60 miles, the French plant within 200 miles, and the American works assumed to be within 100 miles of seaboard. Labor conditions are considered to be as found in the various countries.

The electrode consumption is based upon the use of electrodes threaded for continuous feeding, a practice not now universally followed in ferro-alloy plants. The figures indicate that it costs $14.55 to 31.7 per cent more to manufacture 50 per cent ferro-silicon in the United States than in Norway. This difference may be considered as due largely to the price of power. The difference in the total cost of power in Norway and the United States for a ton of 50 per cent ferro-silicon is $14.68 per ton. Labor is also lower, but this is offset by the higher cost of raw material abroad. The duty on ferro-silicon under the Underwood bill is 15 per cent ad valorem. The selling price of 50 per cent ferro-silicon f. o. b., Pittsburgh, Pa., is $70 to $75 per long ton.

Uses of Ferro-Silicon

The chief use of ferro-silicon is for the deoxidation of steel by the formation of silica or silicates with any free oxygen or oxides, the silica or silicates thus formed passing into the slag. A considerable amount is used for making fixed additions to steel. The grade containing 25 to 30 per cent silicon is used as a substitute for blast-furnace grades containing 10 to 12 per cent silicon. It is especially useful for direct addition to the open-hearth furnace, the cupola, or the converter, but may be added in the ladle. It is compact, in large pieces, and of sufficient specific gravity to sink readily in the bath. It reacts more energetically than does the alloy with the lower percentage of silicon and the quantities employed need not be so large. This grade is used chiefly for fixed additions of silicon.

Ferro-silicon that has 45 to 50 per cent silicon is particularly employed for deoxidation. It reacts like the 25 to 30 per cent alloy but more energetically, and is used when the greater specific gravity of the latter is not essential. It has a lower fusion point than the lower grade. It is subject to disintegration and is the only grade from which poisonous gases have been known to emanate. It is used in greater quantity than any of the other grades.

The grade containing 75 per cent silicon is employed for additions to ordinary castings. It can be used to modify a casting so as to obtain either a white or a gray casting by addition to the casting ladle. For a fixed addition in the production of silicon steels, such as transformer steel, 75 to 90 per cent ferro-silicon is employed.

Hadfield developed steel containing 1 to 5 per cent silicon, but the usual grade contains 2.75 per cent silicon with the smallest possible amounts of carbon, manganese and other

impurities. After a double-heating treatment this steel has a higher magnetic permeability than the purest iron, but also, as is characteristic of silicon steels, has a high electrical resistance. As a result of its high permeability, it has a low hysteresis loss, and is the most desirable material known for use in electrical generating machinery.

How to Buy Hoist Controllers

(*Continued from page* 874)

would pay a handsome return on the additional investment necessary over what would be required for a resistor that would ordinarily be supplied for starting a 300-horsepower motor at full load on a 35-second operating cycle.

It would be conservative to say that no steel plant is free from trouble and expense incident to accelerating resistance of insufficient current carrying capacity, and that in a great many cases the repair and maintenance cost of the resistor alone, neglecting the expense and interruption to plant operation incident to resistor burnouts, etc., would justify the expense of replacing the troublesome resistor.

Slow Speed Automatic Ash Hoist

The equipment to be considered here is used for hoisting ashes from a gas producer pit and dumping into a car on an elevated track, the general arrangement of the hoist being shown in Fig. 3.

The controller was designed to be operated by men who wheel ashes from the gas producer, it being only necessary for them to push a button and the bucket of ashes is hoisted and dumped and the bucket returned to the loading position without further attention. A simplified wiring diagram and sequence of switches are given in Fig. 6.

Without the automatic controller the man who would operate the hoist would have to be more skilled and be paid a higher wage rate than would a man who was only required to wheel ashes. This feature alone would justify the installation of the automatic controller. Then the possibilities of an incapable operator damaging the hoisting apparatus is eliminated. The possibility of a properly designed automatic controller failing and causing damage to the hoisting equipment, is very remote, as is evidenced by the record of failures referred to in our description of a blast furnace skip hoist automatic controller.

It will be noted in Fig. 9 that nearly double the time is required to lower than is required to hoist the bucket. The reason for this is that five minutes elapse from the time that the full bucket of ashes is started up until the man returns with a barrow of ashes for the next empty bucket. Advantage is taken of this time and the bucket is allowed to return all the way down on very low speed in order to reduce wear and tear on the apparatus and simplify the control.

Requirements of Ash Hoist Controller

The requirements of a controller for this service would be about similar to that of a blast furnace skip hoist controller in that it should have every protection to avoid damage to the hoisting equipment and that it should function positively and accurately. These features together with maintenance and initial cost should be given most consideration. Continuity of operation although desirable is not absolutely essential as is the case with a blast furnace skip hoist controller.

A controller for this service should be enclosed to prevent its being tampered with. All repairs and adjustments should be made by a competent electrical repairman. The accelerating resistance should carry full load current continuously with normal temperature rise to avoid excessive heating in case that the accelerating switches fail to close and allow part of the resistance to remain in circuit.

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SCIENTIFICALLY HEAT TREATED
DROP FORGINGS
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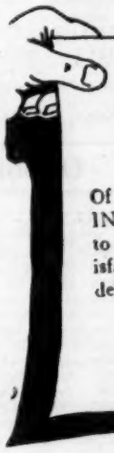
The Steel Improvement Company
CLEVELAND, OHIO


Malleable Iron CASTINGS
Of HIGH TENSILE STRENGTH and EXCEEDINGLY TOUGH *Large or small,* we are equipped to make your castings, and guarantee complete satisfaction It is our business to serve you. Quick delivery our specialty *Write us*
The General Malleable Company
WARREN, OHIO

Opportunities

Men Wanted
Minimum, 50 words, $1.00. Each additional word, 2c. All capitals, 50 words, $1.50. Each additional word, 3c.

Position Wanted
Minimum, 25 words, 50c. Each additional word, 2c. All capitals, 25 words, 75c. Each additional word, 3c.

Miscellaneous Classified
Minimum, 25 words, $1.00. Each additional word, 4c. All capitals, 25 words, $2.00. Each additional word, 8c.

Remittance should be made to cover eight (8) words for address if box number is used.

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Men Wanted

WANTED: — A FIRST CLASS TOOL maker who thoroughly understands deep drawing and spinning. State experience and salary wanted. Ingram-Richardson Mfg. Co., Beaver Falls, Pa.

WANTED:—GENERAL FOREMAN, A-1 FOR LARGE JOBBING MACHINE SHOP, LIGHT AND HEAVY WORK. STATE AGE, SALARY EXPECTED, REFERENCES. ADDRESS BOX 403, THE IRON TRADE REVIEW, CLEVELAND, OHIO.

WANTED: — EXPERIENCED FARM implement salesman. Commission basis, but traveling expenses and drawing account advanced. Give experience with references and state drawing account would expect. Address Box 404, THE IRON TRADE REVIEW, Cleveland, O.

UNDERSIGNED COUNSEL WILL CONFidentially negotiate preliminaries for important executive, technical, administrative and professional positions, insuring strictest privacy. Not an agency, but a highly-endorsed, high grade method of negotiating preliminaries only, for $3,000 to $12,000 men. Send address only for explanation. R. W. Bixby, Lock Box 134-E9, Buffalo, N. Y.

THE BEST WAY TO GET A GOOD POsition in drafting or engineering is to file an application direct with some of our clients who are depending on us to get competent and experienced applicants for their vacant positions. Send stamp for blank and list of vacant positions. The Cleveland Engineering Agency Co., Rose building, Cleveland, O.

Positions Wanted

YOUNG MAN DESIRES POSITION AS purchasing agent, cost accountant or organizer; would accept position as manager of small manufacturing plant; 12 years' experience in shop and office management. Address Box 327, THE IRON TRADE REVIEW, Cleveland, O.

EXPERIENCED PATTERN MAKER wishes position as foreman; over 10 years in charge of shops employing from 20 to 100 men making patterns for gas and oil engines and electrical machinery. Broad experience with molding machines. Address Box 253, THE IRON TRADE REVIEW, Cleveland, O.

AGGRESSIVE, COMPETENT MAN, more fully qualified than ordinarily by seventeen years successful activity in the steel business, desires operating or executive rolling mill or foundry position requiring practical metallurgical producing, statistical, economic and financial knowledge. Address Box 396, THE IRON TRADE REVIEW, Cleveland, O.

POSITION CHIEF DRAFTSMAN DEsired by technical graduate with 9 years' experience at iron and steel works in capacities draftsman, designer and calculator, draftsman in charge and engineer of construction. Past record covered by very best references as to ability and personality. Address Box 276, THE IRON TRADE REVIEW, Cleveland.

WHEN YOU NEED A HIGH GRADE executive, engineer, draftsman or any technical man, consult The Engineering Agency, Inc., (Est. 21 years) 1662 Monadnock Block, Chicago.

POSITION WANTED AS FOUNDRY superintendent or foreman; stove preferred. Can handle men efficiently. Have also had experience on match plate and molding machine. Looking for something permanent. Address Box 372, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED AS GENERAL SUperintendent steel plant, open hearth or blooming mill; graduate Massachusetts Institute Technology in mechanical engineering and metallurgy; 17 years' experience; 8 years as assistant general manager steel corporation; open for engagement April 1; highest quality reference. For full particulars and interview Address Box 370, THE IRON TRADE REVIEW, Cleveland, O.

AN EXPERIENCED MOLDER, TECHnical graduate, would like to have a position where opportunity is for advancement. Address Box 325, THE IRON TRADE REVIEW, Cleveland, O.

MASTER MECHANIC WANTS POSItion; thoroughly experienced in constructing and operating rolling mills, open-hearth and blast furnaces; by-product coke ovens; water works, hydro-electric and turbo-generating plants; has machine shop practice; best references. Address Box 354, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED AS FOUNDRY superintendent; thoroughly experienced in efficiency, production and scientific management, now available with A-1 references. Address Box 374, THE IRON TRADE REVIEW, Cleveland, O.

OFFICE MANAGER, FACTORY OR cost accountant, 30 years of age with 12 years practical experience, capable to analyze, install or perfect complete factory system. Highest testimonials. Address Box 254, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED: — FIRST CLASS steel range man with 24 years' experience; can make first class templets for hotel or family ranges; can handle men to good advantage; best of references. Address Box 398, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED:—ROLL TURNER; will take charge of turning; 20 years' experience on tin, sheet, jobbing and plate mills. Looking for something permanent; highest references. Address Box 382, THE IRON TRADE REVIEW, Cleveland, O.

CHEMIST: ENERGETIC, PROGRESSIVE and reliable; 19 years' experience in iron and steel laboratories. Excellent references, desires position at once. Address Box 383, THE IRON TRADE REVIEW, Cleveland.

Opportunities

FOR SALE: — JOBBING FOUNDRY complete with buildings, exceptional low price, can be put into operation at once. Buildings are of corrugated iron; foundry 60 x 60 ft., pattern shop 16 x 30 ft.; boiler, engine and coreroom 40 x 40 ft. Equipment consists of 48-in. cupola, core ovens, 20-H. P. engine, 30-H. P. boiler, brass furnace, wood turning lathe, band saw, drill press, 2 sets heavy heating stove patterns, 36 x 48-in. rattler, 50 iron flasks, 12 x 6-in. and 16 x 16-in., 200 wood flasks all sizes, etc. Located on leased grounds 150 x 150-ft.; lease good for ten years. Wm. White & Sons, 411 Elm St., Chattanooga, Tenn.

FOR SALE: — OVER 100 MACHINES, bargain prices. Lathes, Presses, Shears, Forges, Bolt Machinery, Automatics, Shafting, Pulleys, etc. Descriptive List, Prices and Photos on request. SHELTON COMPANY, SHELTON, CONN.

FOR SALE: I WILL SELL TO AN established machine shop and foundry the rights to manufacture a superior line of small tool equipment. I also desire to become identified with company either as factory or sales manager. Have had 25 years experience. Price on the several patents offered $25,000. of which amount would take $15,000. in securities. The field is large and the tools possess great merit over anything of its kind ever manufactured and I can prove that same will be a profitable line to any concern that wants additional business and has the necessary capital to finance an article of merit. I prefer to deal direct with principals. Address Box 392, THE IRON TRADE REVIEW, Cleveland, O.

WANTED TO ARRANGE FOR manufacture and sale of a new sheet metal household article. A good proposition for the right parties. Necessary in every home. A. T. Powell, Port Chester, N. Y.

FOR SALE: — FOUNDRY AND MAchine shop in Kansas City. Established 25 years. Doing $100,000 to $125,000 business yearly. One and one quarter acres land, brick buildings, located in the center of manufacturing district. Have practically a monopoly on architectural castings in this city, and making a large amount of machine castings. Can make very attractive price and terms. Address Box 378, THE IRON TRADE REVIEW, Cleveland, O.

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We do all kinds of job work in trimming and forming steel at attractive prices.

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